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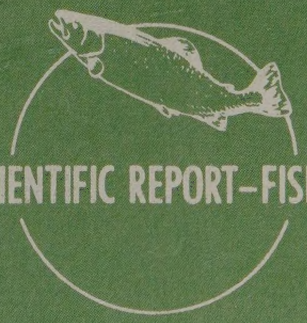
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

Macrozooplankton and Small Nekton in the Coastal Waters Off Vancouver Island (Canada) and Washington, Spring and Fall of 1963



SPECIAL SCIENTIFIC REPORT–FISHERIES No. 619

NOTE

Until October 2, 1970, the National Marine Fisheries Service, Department of Commerce, was the Bureau of Commercial Fisheries, Department of the Interior. Throughout the body of this report, which was prepared for printing before October 2, the older term is used.

UNITED STATES DEPARTMENT OF COMMERCE
Maurice H. Stans, *Secretary*
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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Philip M. Roedel, *Director*

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By

DONALD S. DAY

Special Scientific Report--Fisheries No. 619

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Macrozooplankton and Small Nekton in the Coastal Waters Off Vancouver Island (Canada) and Washington, Spring and Fall of 1963

By

DONALD S. DAY, Oceanographer

National Marine Fisheries Service Biological Laboratory
Seattle, Washington 98102

ABSTRACT

Eight species of euphausiids, 5 species of mysids, and 14 species of fish were identified. Euphausiids composed about 90 percent by number of the organisms caught, and fluctuations in their abundance were concomitant with changes in the biomass of the samples. The bulk of the organisms collected at night were in the upper 30 m. All species were taken by a 0.9-m. Isaacs-Kidd midwater trawl.

The concentration of organisms was lowest near shore, reached a maximum at or near the outer edge of the continental shelf, and decreased again farther offshore. The concentration of organisms was greater in the southern part of the region than in the northern part. This distribution was apparently related to the general surface circulation. Seasonal fluctuations were indicated by a decrease in biomass from spring to fall.

INTRODUCTION

Predictions of the location and abundance of commercial fishes that depend on plankton for food can be improved by a knowledge of the distribution and numbers of plankton within large regions of the sea. The waters over the continental shelf and slope along the west coast of the United States and Canada appear to be one of the world's highly productive marine environments (Reid, 1962). Little is known, however, about the distribution and composition of the macrozooplankton and small nekton inhabiting the region off the coasts of Vancouver Island, British Columbia, and the State of Washington. Aron (1959, 1962) reported on the abundance and distribution of oceanic macrozooplankton and small nekton in the northeastern Pacific Ocean during the summer of 1957 and the summer and early fall of 1958, but he obtained only a few samples in the coastal region. Pearcy (1964) and Pearcy and Laurs (1966) studied the seasonal composition, distribution, and migration of the mesopelagic fishes over the continental terrace off the Oregon coast. The taxonomy and distribution of euphausiids in the Pacific Ocean has been studied by Banner (1949); Boden, Johnson, and Brinton (1955); Brinton (1962a); and Hebard (1966). Banner (1947, 1948) investigated the taxonomy and distribution of the mysids in the northeastern Pacific Ocean.

In spring and fall 1963 during oceanographic cruises of the RV George B. Kelez (Ingraham, 1967), macrozooplankton and small nekton were collected within 185 km. of shore from Cape Cook on Vancouver Island to Willapa Bay, Wash. The purpose of my report is to show the abundance, distribution, and composition of these organisms over the continental shelf and slope.

METHODS

A 0.9-m. Isaacs-Kidd midwater trawl (Isaacs and Kidd, 1953; Aron, 1962) was used to sample the animal population. The body and throat of the net were constructed from 64-mm. (stretched measure) cotton netting with a liner of 13-mm. bait netting in the throat (fig. 1). The cod end was a nylon plankton net of 3-mm. mesh with a mouth 1/2 m. in diameter.

Collections were obtained from May 3 to May 16 (79 samples) and from October 28 to November 22 (60 samples) along lines perpendicular to the coast. Four lines of stations were spaced about 111 km. apart during the spring cruise (fig. 2), and nine lines of stations were spaced about 56 km. apart during the fall cruise (fig. 3). Stations were located near the 55-, 183-, 914-, 1,829-, and 2,377-m. depth contours on each line except line V, where all stations were near the 183-m. depth contour. An additional station at the 119-m. depth contour was sampled during the fall cruise on lines II, III, IV, VI, VII, and VIII.

During the lowering, towing, and retrieval of the net, the speed of the vessel was maintained at 3 to 4 knots. Depth of the trawl was based on a 4:1 ratio for wire length to depth, established by repeated lowerings of the trawl with a bathythermograph attached to the depressor. Depths are believed to be accurate within $\pm$20 m. at a depth of 150 m. and $\pm$8 m. at 30 m. The average length of time for lowering and retrieving the net from the sampling depths was: 7 minutes for 150 m., 3 minutes for 75 m., 1 minute for 30 m., and less than 1 minute for 20 m. or shallower. Additional information on the towing characteristics of similar gear is given by Aron, Raxter, Noel, and Andrews (1964). The catches probably included animals from water above the sampling depths, because the net was open throughout the tows.

Samples were obtained from shallow oblique tows (30 m. to the surface) at each station during both cruises (appendix tables 1 and 2). In addition, samples from deep oblique tows (150-30 m.) were taken at stations where the bottom depth was 914, 1,829, or 2,377 m. during the spring cruise (appendix table 1). All tows were made between 1 hour after sunset and 1 hour before sunrise. Tows were made in steps: for the shallow tows, 8 m. of cable were retrieved every 2 minutes for 15 steps; and for the deep tows, 16 m. of cable were retrieved every minute for 30 steps until 120 m. of cable remained in the water. This remaining length of cable was retrieved as rapidly as possible, usually within 1 minute. Thus, the duration of the tows was 30 minutes from the time the net reached maximum depth until it was at the upper limit (surface or 30 m.) of the depth interval.

Horizontal tows were taken at two stations during the spring cruise to provide information on vertical movement of organisms in the upper 150 m. (appendix table 3). At station 8, samples were obtained at dusk, midnight, dawn, and afternoon during a 24-hour period at the surface and depths of 15, 30, 75, and 150 m. (Because of equipment failure, samples were collected at 4:00 p.m. instead of "noon.") At station 17, samples were taken at dusk, midnight, dawn, and noon, at the surface and depths of 10, 20, 30, 75, and 150 m. At both stations, the net was at the specified depth for 10 minutes.

At the laboratory, water was removed from the samples by filtering through nylon cloth having about 1.5-mm. mesh. Fish and medusae larger than 1 cm. were removed, and the remainder of the sample was weighed with an accuracy of $\pm$0.1 g. The volume of each filtered sample was determined by displacement of 5-percent Formalin in a graduated cylinder. The values for weight and volume had a correlation coefficient of 0.99. In this paper, weight is used as the measure of biomass. Samples of more than 30 g. were subdivided by a Folsom plankton splitter (McEwen, Johnson, and Folsom, 1954) so that the subsamples contained about 400 organisms. The organisms from

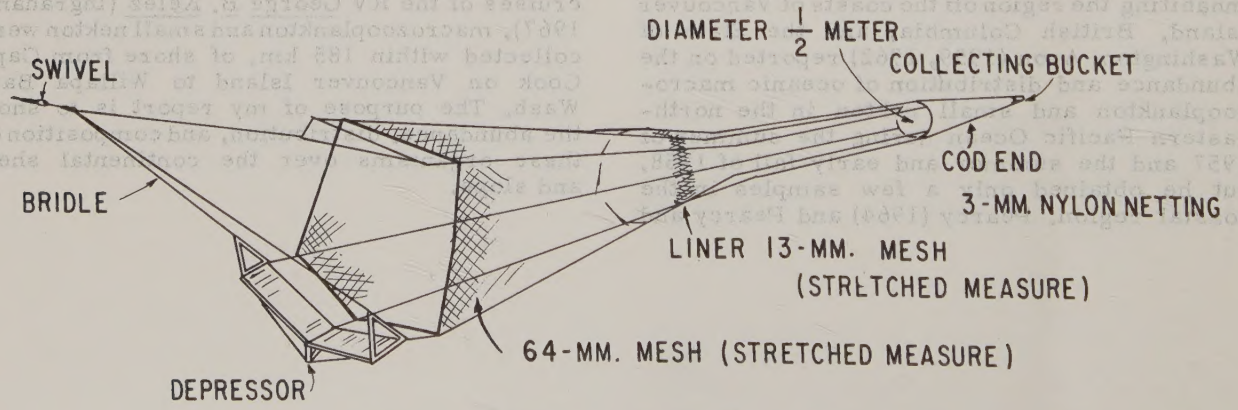

Figure 1.--The 0.9-m. Isaacs-Kidd midwater trawl.

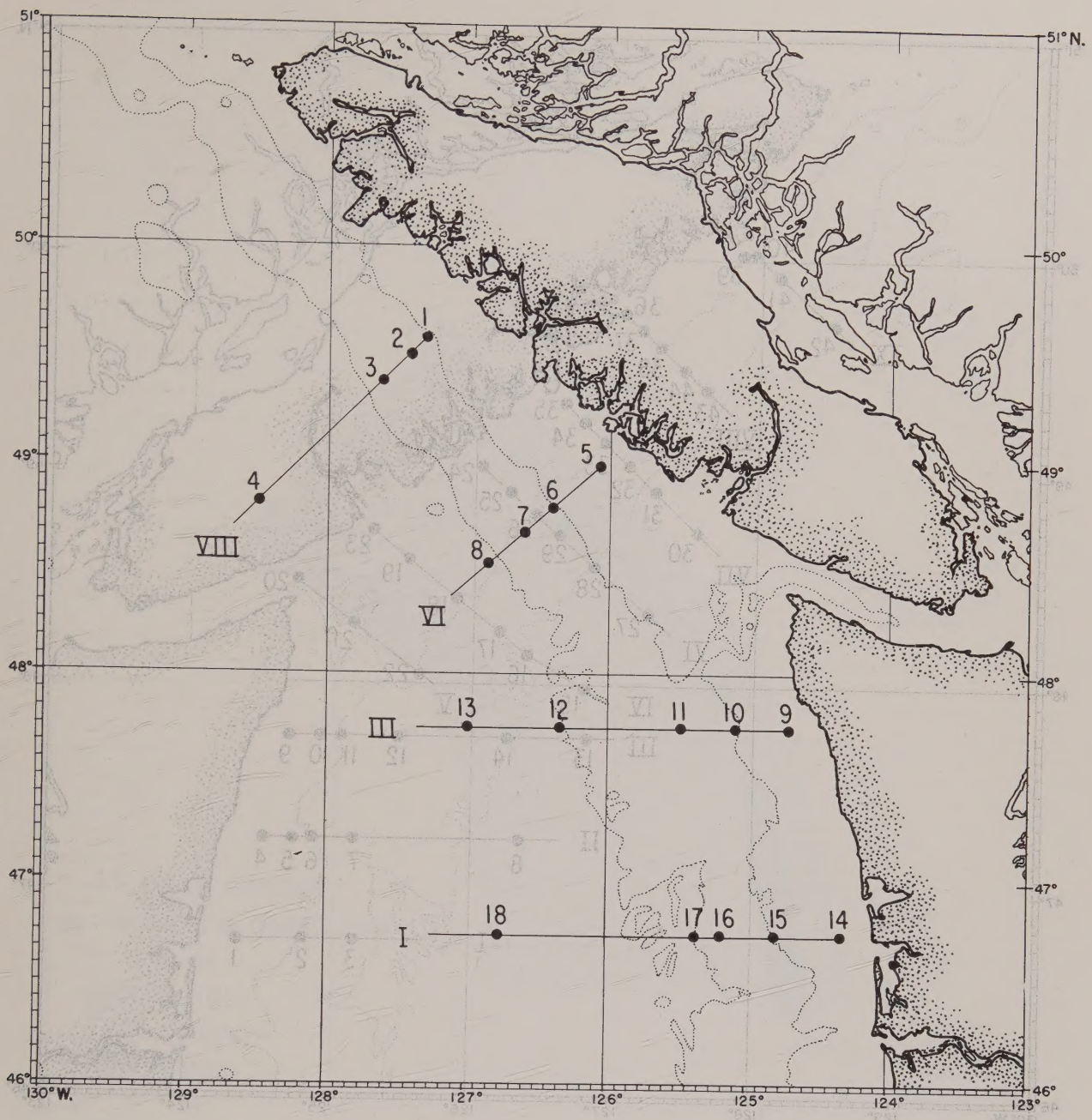

Figure 2.--Station locations, spring 1963. (The 183- and 1,829-m. depth contours are shown.)

these subsamples and the remaining samples were sorted according to taxonomic groups and counted (appendix tables 1, 2, and 3). Species of euphausiids, mysids, and fish were identified and their distributions are discussed in the following sections.

To evaluate sampling variability, four replicate shallow and deep oblique tows (four samples in each interval: surface to 30 m. and 30-150 m.) were made during the spring cruise at station 12 and two replicate shallow tows were made at most stations on lines III, VI, and VII during the fall cruise (total of 30 samples). Averaged coefficients of variation for the wet-weight values (computed from the replicate tows) were used as criteria for judging the significance of areal differences in the biomass values (figs. 4 and 5). The coefficients were 28 percent in spring and 46 percent in fall for the shallow tows, and 17 percent in spring for the deep tows.

Figure 3.--Station locations, fall 1963. (The 183- and 1,829-m. depth contours are shown.)

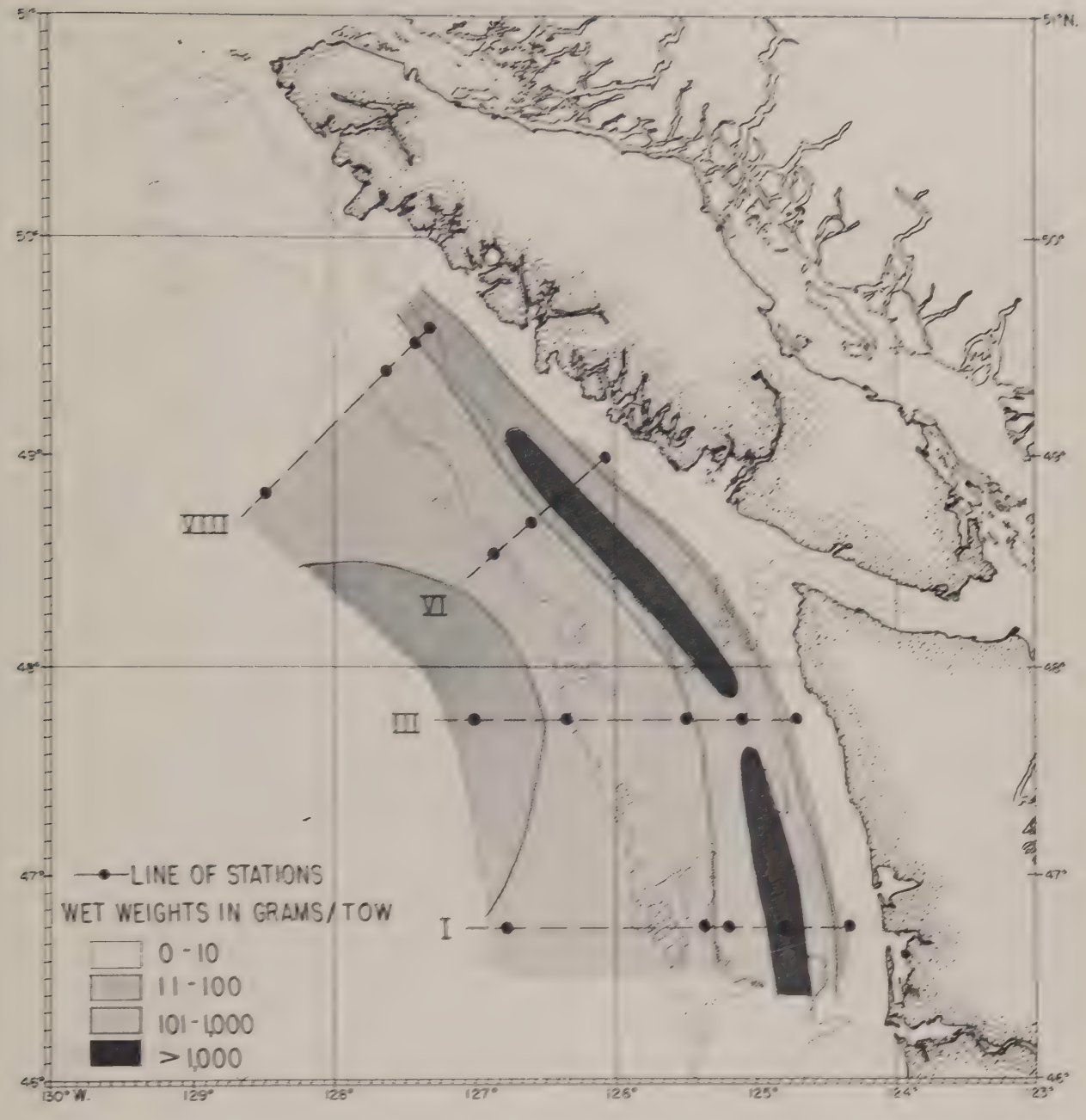

Figure 4.--Distribution of biomass as determined by shallow oblique tows (surface to 70 m.), spring 1963. (The 183- and 1,829-m. depth contours are shown.)

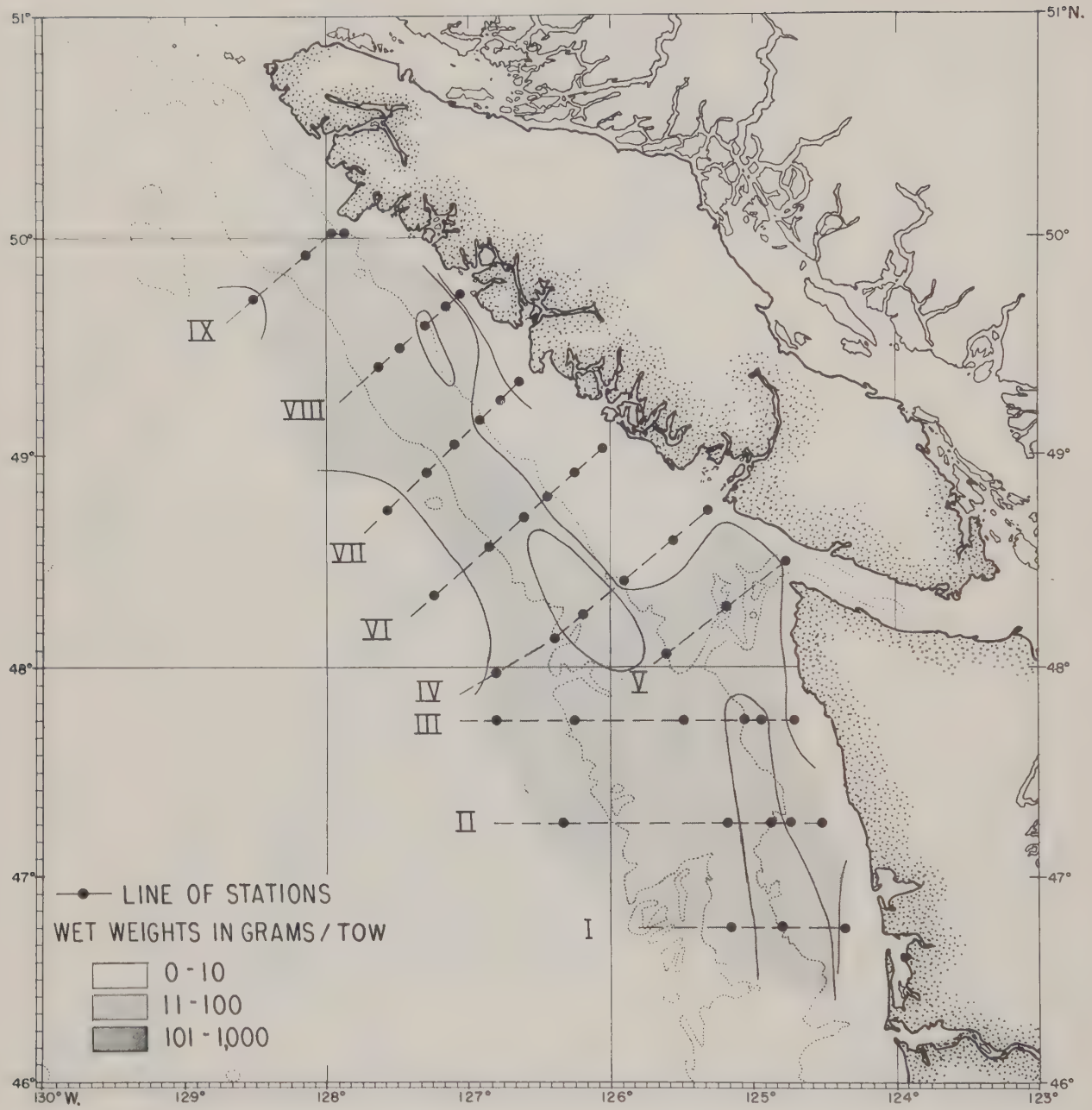

Figure 5.--Distribution of biomass as determined by shallow oblique tows (surface to 30 m.), fall 1963. (The 183- and 1,829-m. depth contours are shown.)

GEOGRAPHIC DISTRIBUTION

The quantity of macrozooplankton and small nekton that were taken within the upper 30 m. of the water column varied substantially in the study area both seasonally and geographically. The relative abundance of macrozooplankton within the study area and possible reasons for variations in their distribution are described in the subsequent sections on biomass and major taxonomic groups.

BIOMASS

The biomass in the surface layer, estimated from the shallow oblique tows, was considerably greater in the spring than in the fall. In both seasons abundance varied widely seaward from the coast and from north to south along the coast. Along lines perpendicular to the coast, the biomass was minimal nearshore, reached a maximum at or near the outer edge of the continental shelf (183-m. depth contour), and decreased again farther offshore (figs. 4 and 5). The only exceptions to this general distribution were in the fall along line V, where all stations were located at the 183-m. depth contour near the Juan de Fuca Canyon, and along line VIII, where the biomass reached a maximum over the 119-m. depth contour, decreased to a minimum at 183 m., and then increased seaward. Neither the distributions of surface temperature and salinity, nor currents provide an immediate explanation for this general pattern. Similar distributions have been reported by Mednikov (1958) for the Kurile-Kamchatka region of the northwestern Pacific Ocean and by St. John (1958) for the Cape Hatteras region of the northwestern Atlantic Ocean.

The greatest biomass was found in the southern part of the region. The boundary between relatively high and low biomass was between lines VI and VIII in spring, and shifted about 111 km. to the south, between lines IV and VI, in fall.

The distribution of biomass was similar to the general features (Ingraham, 1967) of the surface circulation (surface to 200 m.). Low biomass coincided with a distinct onshore movement of offshore water near the middle of Vancouver Island (figs. 6 and 7). Biomass was high where the circulation was characterized by eddies or reduced flows off the coasts of Washington and southern Vancouver Island. There was no evidence of continuous northward flow of near-shore water along Vancouver Island north of lat. 48 N. (Ingraham, 1967).

TAXONOMIC GROUPS

The seasonal and geographic changes in the distribution of biomass were examined relative to the distribution of the most important taxonomic groups. Euphausiids were of primary concern since they contributed the largest numbers to the biomass.

Euphausiids

Eight species of euphausiids were identified: Euphausia pacifica, Thysanoessa spinifera, T. longipes, T. raschii, Tessarabrachion oculatus, Nematoscelis difficilis, Nematobrachion flexipes, and Stylocheiron maximum. These species constituted 90 percent, by number, of the total catch (figs. 8 and 9). E. pacifica and T. spinifera were the most abundant euphausiid species, contributing 76 and 14 percent, by number, of the organisms collected (figs. 10-13). The differences in biomass from north to south (figs. 4 and 5) were evidently related to the distribution of E. pacifica (figs. 10 and 11). Ninety-five percent of the E. pacifica, by number, were collected from the area of high biomass. T. spinifera was usually more prominent, relative to the total catch, where the abundance of E. pacifica was low.

The record of seasonal changes in abundance and composition of euphausiids (tables 1 and 2) indicate larger numbers of E. pacifica in spring than in fall by a ratio of about 2 to 1. Numbers of T. spinifera increased slightly but their percentage of the total catch increased markedly during the same period (table 1). The substantial decrease in abundance of E. pacifica accounted for most of the reduction in biomass from spring to fall.

The seasonal decrease in biomass was also influenced by the presence of larger specimens of E. pacifica and T. spinifera in spring than fall. Brinton (1962b) stated that E. pacifica may live as long as 2 years and spawn at least twice and that two size-classes spawn off central California in a period from April to June: (1) males 13 to 14 mm. and females 13 to 16 mm., and (2) males 17 to 19 mm. and females 18 to 24 mm. If these size-classes represent age-groups I and II, E. pacifica collected in spring (fig. 14) were primarily of age-group II while most of the catch in fall was of age-group I, with only a remnant of age-group II. The similarity in seasonal shift in the modal size of T. spinifera (fig. 15) and E. pacifica (fig. 14) suggests similar seasonal age-class composition of the two species. Because the mesh in the 0.9-m. midwater trawl did not retain euphausiids smaller than 10 mm., the O age group could not be evaluated.

Seasonal abundance and dominant species of euphausiids were grossly different offshore from the 914-m. contour, south of the Strait of Juan de Fuca. E. pacifica was dominant in spring, but T. spinifera dominated or shared dominance with E. pacifica in the fall (figs. 10-13). Numbers of E. pacifica were relatively

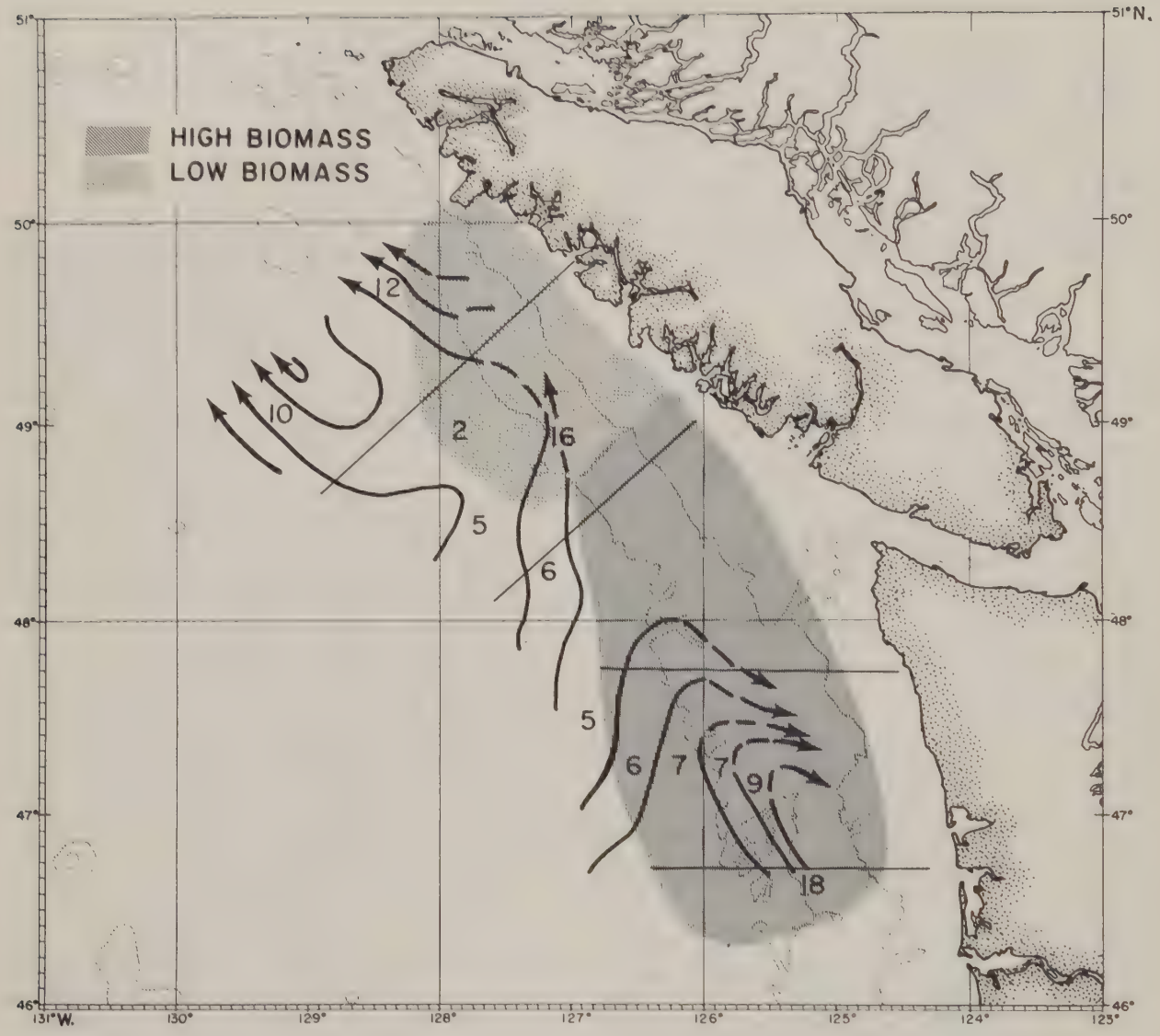

Figure 6.--Geopotential topography, 0/1,500 db., spring 1963. (The 183- and 1,829-m. depth contours are shown. Numbers indicate current velocities, cm./sec.)

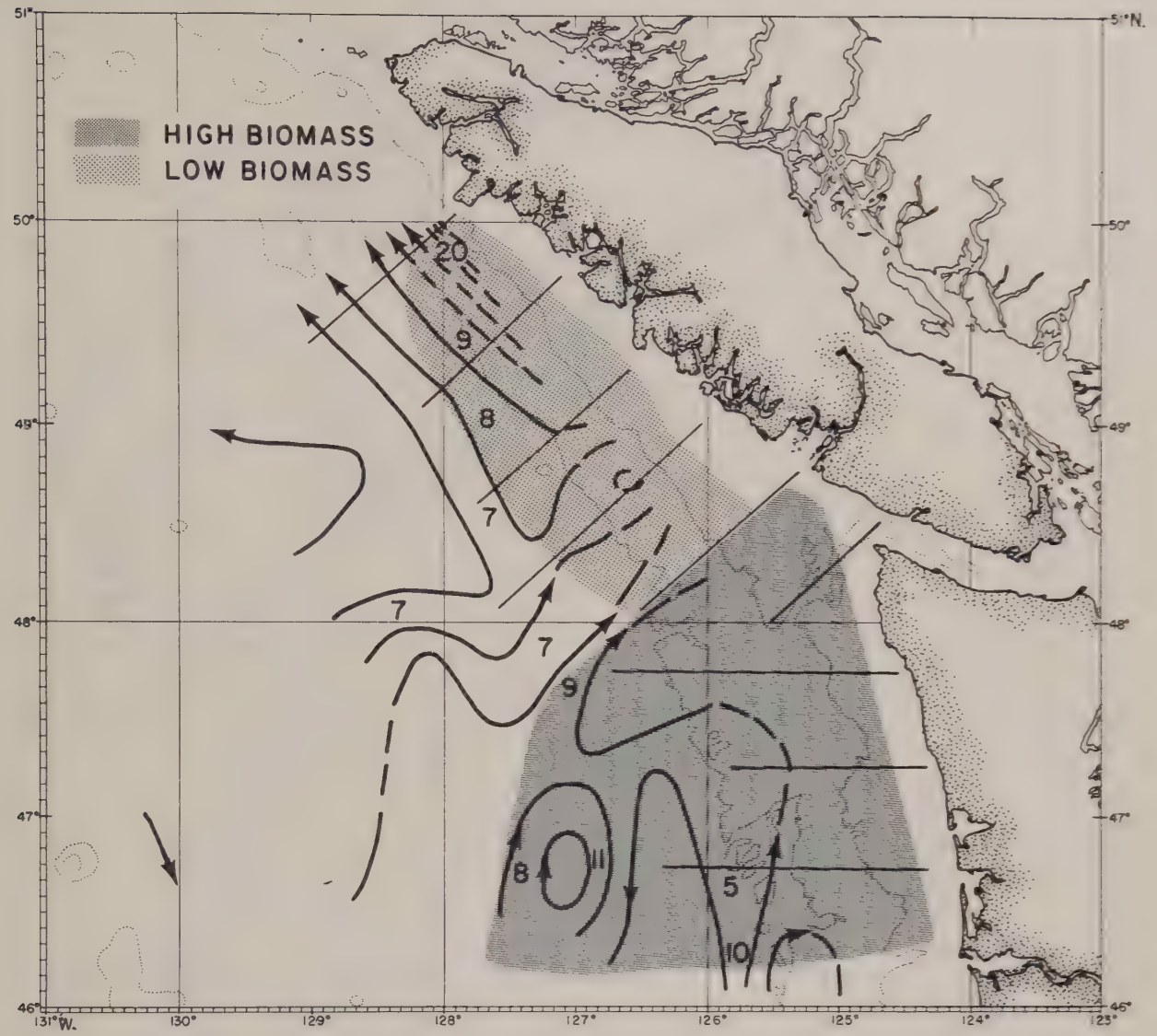

Figure 7.--Geopotential topography, 0/1,500 db., fall 1963. (The 183- and 1,829-m. depth contours are shown. Numbers indicate current velocities, cm./sec.)

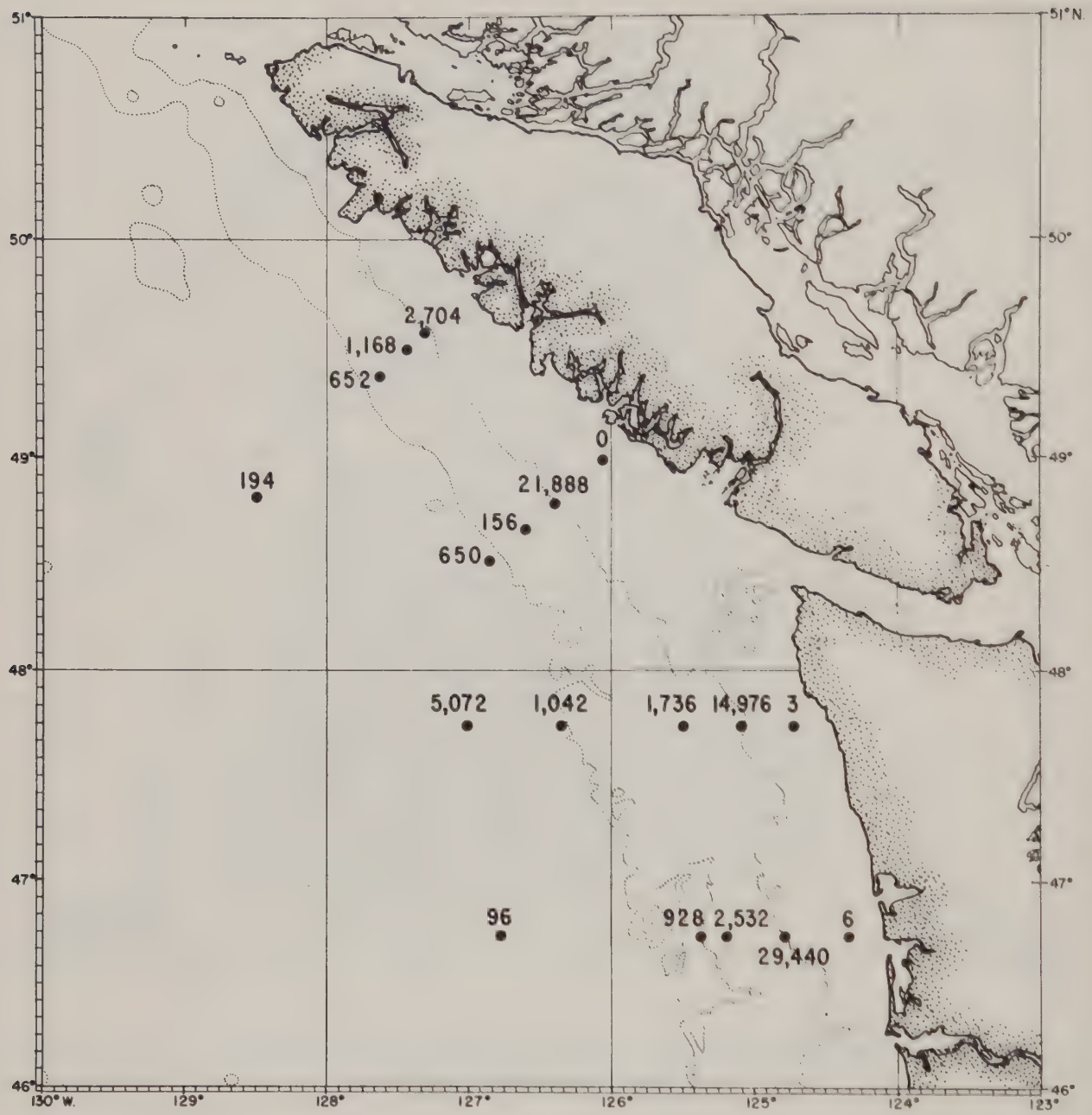

Figure 8.--Number of euphausiids taken during 30-minute oblique tows from the surface to 30-m. depth, spring 1963. (The 183- and 1,829-m. depth contours are shown as dotted lines.)

Figure 9.--Number of euphausiids taken during 30-minute oblique tows from the surface to 30-m. depth, fall 1963. (The 183- and 1,829-m. depth contours are shown as dotted lines.)

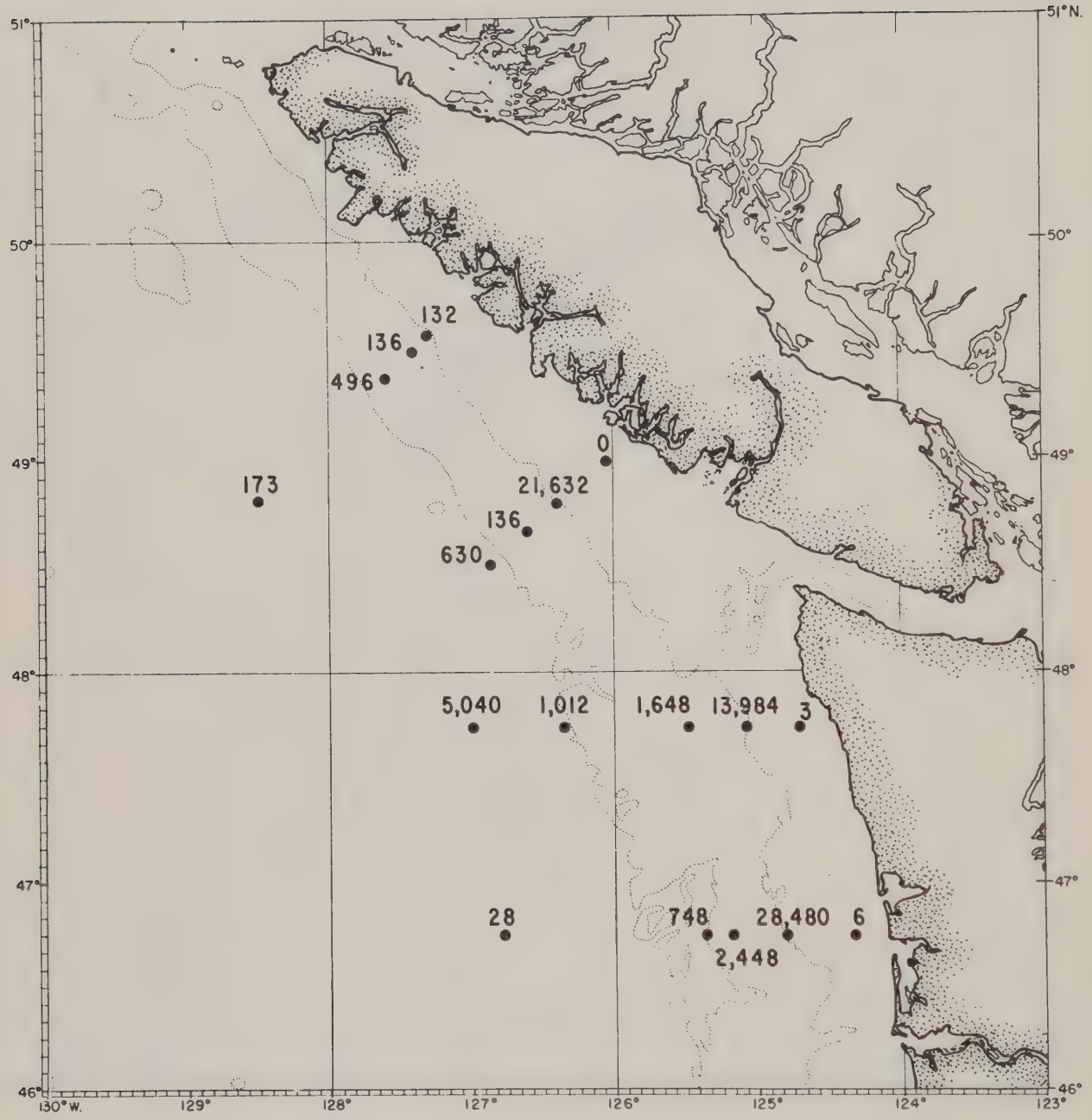

Figure 10.--Number of Euphausia pacifica taken during 30-minute oblique tows from the surface to 30-m. depth, spring 1963. (The 183- and 1,829-m. depth contours are shown as dotted lines.)

Figure 11.--Number of Euphausia pacifica taken during 30-minute oblique tows from the surface to 30-m. depth, fall 1963. (The 183- and 1,829-m. depth contours are shown as dotted lines.)

Figure 12.--Number of Thysanoessa spinifera taken during 30-minute oblique tows from the surface to 30-m. depth, spring 1963. (The 183- and 1,829-m. depth contours are shown as dotted lines.)

Figure 13.--Number of Thysanoessa spinifera taken during 30-minute oblique tows from the surface to 30-m. depth, fall 1963. (The 183- and 1,829-m. depth contours are shown as dotted lines.)

Table 1.--Number and percentage composition of euphausiid species collected in the surface to 30-m. depth interval at locations sampled in both spring and fall 1963

Species	Euphausiids collected			
	Spring	Fall	Spring	Fall
	Number	Number	Percent	Percent
Euphausia pacifica.....	47,811	22,369	88.4	73.4
Thysanoessa spinifera.....	6,130	7,983	11.3	26.2
Nematoscelis difficilis...	40	53	0.1	0.2
Thysanoessa longipes.....	88	25	0.2	0.1
Nematobrachion flexipes...	0	28	--	0.1
Tessarabrachion oculatus..	1	0	[1] 0.0	--
Total.....	54,070	30,458	100.0	100.0

[1] Less than 0.05.

Table 2.--Total number and percentage composition of euphausiid species collected in the surface to 30-m. depth interval at all stations off Vancouver Island and Washington, spring and fall 1963

Species	Euphausiids collected			
	Spring		Fall	
	Number	Percent	Number	Percent
Euphausia pacifica.....	78,956	92.1	53,171	74.2
Thysanoessa spinifera.....	6,468	7.5	18,101	25.3
Thysanoessa longipes.....	252	0.3	96	0.1
Nematoscelis difficilis....	66	0.1	128	0.2
Nematobrachion flexipes....	12	[1] 0.0	141	0.2
Tessarabrachion oculatus...	1	[1] 0.0	1	[1] 0.0
Thysanoessa raschii.....	0	—	8	[1] 0.0
Total.....	85,755	100.0	71,646	100.0

[1] Less than 0.05.

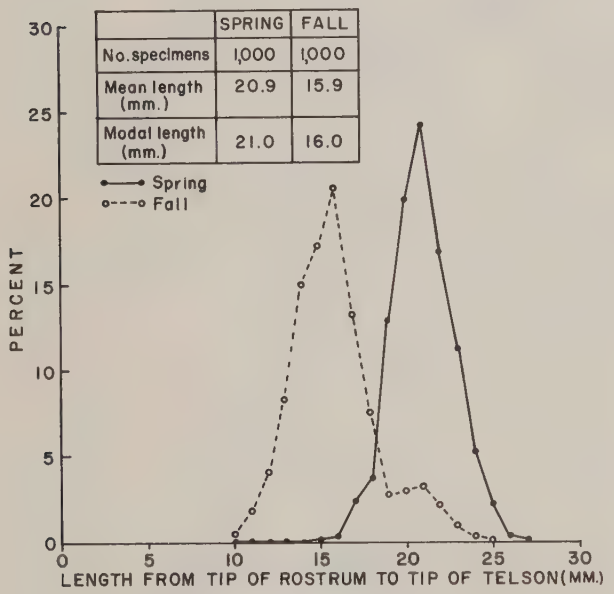

Figure 14.--Size distribution of Euphausia pacifica off Vancouver Island and Washington in spring and fall, 1963.

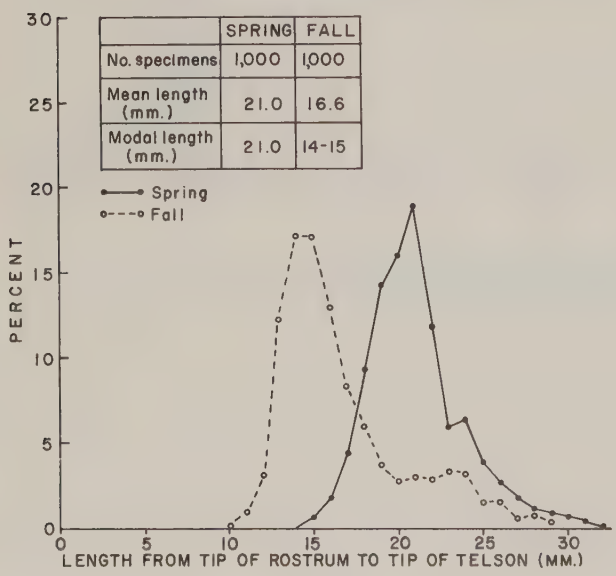

Figure 15.--Size distribution of Thysanoessa spinifera off Vancouver Island and Washington in spring and fall, 1963.

large in spring but much smaller in the fall. Conversely, numbers of T. spinifera were significantly larger in the fall than in the spring. This increase in abundance of T. spinifera may be associated with upwelling that occurs during summer off Washington and Vancouver Island (Doe, 1955). The high abundance of T. spinifera in the southern part of its range has been associated with centers of upwelling by Brinton (1962a).

Of the remaining euphausiid species, N. difficilis was found in significant numbers only in the fall at stations 27 and 28 where it constituted 31 and 27 percent, respectively, of the total euphausiid catch and included egg-bearing females. T. raschii was taken only at station 20 in the mouth of the Strait of Juan de Fuca. Other species appeared only sporadically in the samples.

Other Groups

Larval and postlarval benthic fishes were identified as belonging to the families Cottidae, Scorpaenidae, Hexagrammidae, Liparidae, Pleuronectidae, and Agonidae. Fourteen species of mesopelagic, epipelagic, and neritic fish were identified (table 3).

Mesopelagic fishes were numerous over the continental slope but were not collected over the shelf (table 4). They were in only 2 of 18 samples along the outer edge (183 m.) of the shelf (station 1 in spring and station 39 in fall). Pearcy (1964) found a similar distribution of mesopelagic fishes over the continental slope and shelf off the coast of Oregon.

Table 3.--List of fishes collected by Isaacs-Kidd midwater trawl off Vancouver Island and Washington, spring and fall 1963

Mesopelagic	Epipelagic and neritic
Bathylagidae:	Engraulidae
Bathylagus pacificus.....	Engraulis mordax
Melanostomiatidae:	Osmeridae
Tactostoma macropus.....	Thaleichthys pacificus
Myctophidae:	Scomberesocidae
Electrona arctica[1].....	Cololabis saira
Myctophum californiense[2]	
Tarletonbeania crenularis	Anoplopomatidae
Diaphus theta.....	Anoplopoma fimbria
Lampanyctus leucopsarus[3]	
Lampanyctus ritteri.....	Ammodytidae
	Ammodytes hexapterus
Paralepididae:	
Lestidium ringens	

[1] Scientific name has been changed to Protomyctophum crockeri.
[2] Scientific name has been changed to Symbolophorus californiensis.
[3] Scientific name has been changed to Stenobrachius leucopsarus.

Mysids were caught only in fall at the nearshore stations south of line VI. Five species were identified: Neomysis kadiakensis, N. rayii, N. americana, Acanthomysis macropsis, and A. columbiae. N. kadiakensis was the dominant mysid except at station 20 at the mouth of the Strait of Juan de Fuca. N. rayii was at only two stations; it was the dominant mysid at station 20 but contributed only about 3 percent, by number, to the total mysid catch at station 23. The limited distribution of N. rayii was similar to the distribution of the euphausiid, Thysanoessa raschii.

Table 4.--Numbers of mesopelagic fishes collected in individual trawl samples from the surface to 30-m. depth interval, over different depths of water off Vancouver Island and Washington, spring and fall 1963

Water depth	Line of stations												
	Spring				Fall								
	VIII	VI	III	I	I	II	III	IV	V	VI	VII	VIII	IX
Meters	-Number-												
55	--	0	0	0	0	0	0,0	0	--	0,0	0	0,0	--
119	--	--	--	--	--	0	0,0	0	--	0,0	0	0,0	--
183	4	0	0	0	0	0	0,0	0	0,0,0	0,0	0	0,0	1
914	6	0	12	9	4	4	2,1	5	--	9,4	4	6	2
1,829	14	5	14	6	--	--	11,6	4	--	6,0	6	0,2	8
2,377	1	--	17	4	--	1	18,9	1	--	6,0	5	--	2

VERTICAL DISTRIBUTION

The quantity of macrozooplankton and small nekton that were taken at various depths within the upper 150 m. of the water column differed diurnally and between sampling locations. The relative abundance of macrozooplankton and small nekton within the water column are described by the distributions of biomass and major taxonomic groups.

BIOMASS

Vertical distribution was investigated in the present study to determine the depths of maximum abundance within the upper 150 m. throughout 24-hour periods. During the spring cruise at stations 8 and 17, horizontal tows were taken at dusk, midnight, dawn, and noon or afternoon within 24-hour periods. The use of a net with an opening and closing mechanism would have provided better resolution of the depth distribution in any one sample, but some generalizations can be made from data obtained with an open trawl. The must larger quantities of organisms collected in the upper 150 m. at dusk, midnight, and dawn than in the afternoon (station 8) or at noon (station 17) indicated an apparent diurnal vertical migration to depths in excess of 150 m. (figs. 16 and 17).

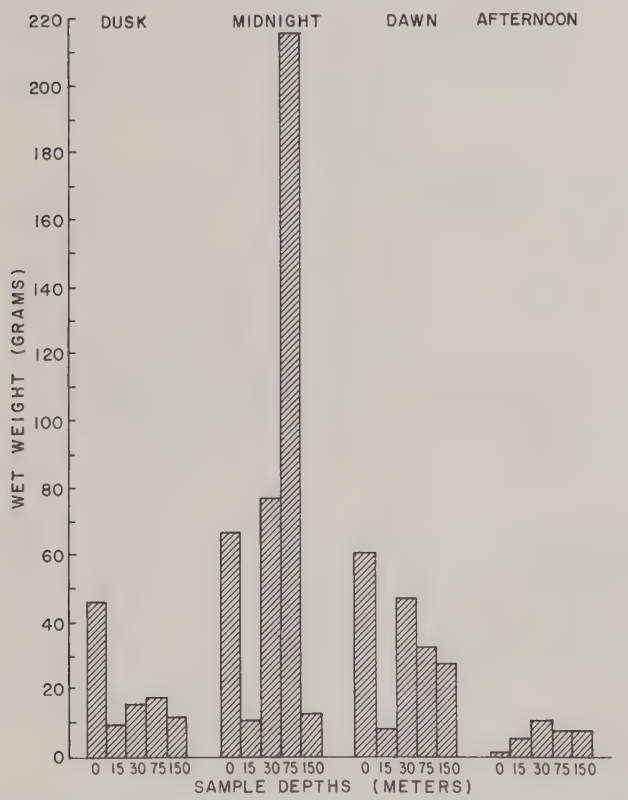

Figure 16.--Distribution of biomass by time of day and depth, at station 8, spring 1963.

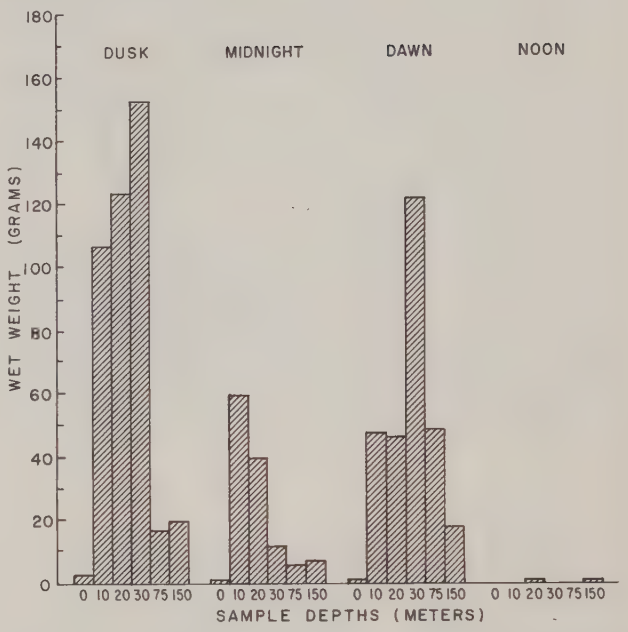

Figure 17.--Distribution of biomass by time of day and depth, at station 17, spring 1963.

Additional information on the nighttime vertical distribution of the biomass was provided by samples from oblique tows near the 914-, 1,829-, and 2,377-m. depth contours during the spring cruise. The well-mixed surface layer was sampled by towing obliquely through the upper 30 m. Tows from 150 to 30 m. were taken to sample the layer from the base of the halocline through the thermocline. Most of the organisms were collected in the surface layer at all stations except station 7 (fig. 18).

TAXONOMIC GROUPS

Distributions of the most important taxonomic groups were examined in relation to time of sampling and some oceanic features. Euphausiids and crab larvae were of primary concern since they contributed the largest numbers to the biomass.

Euphausiids

In the spring some gross differences were apparent in the nighttime vertical distribution of several euphausiid species. Most E. pacifica and T. spinifera were caught in the shallow oblique tows, whereas T. oculatus was most abundant in the deep oblique tows (table 5).

Catches from horizontal tows at stations 8 and 17 indicated that euphausiids were rare at the surface throughout the 24-hour sampling periods. At dusk, midnight, and dawn, the

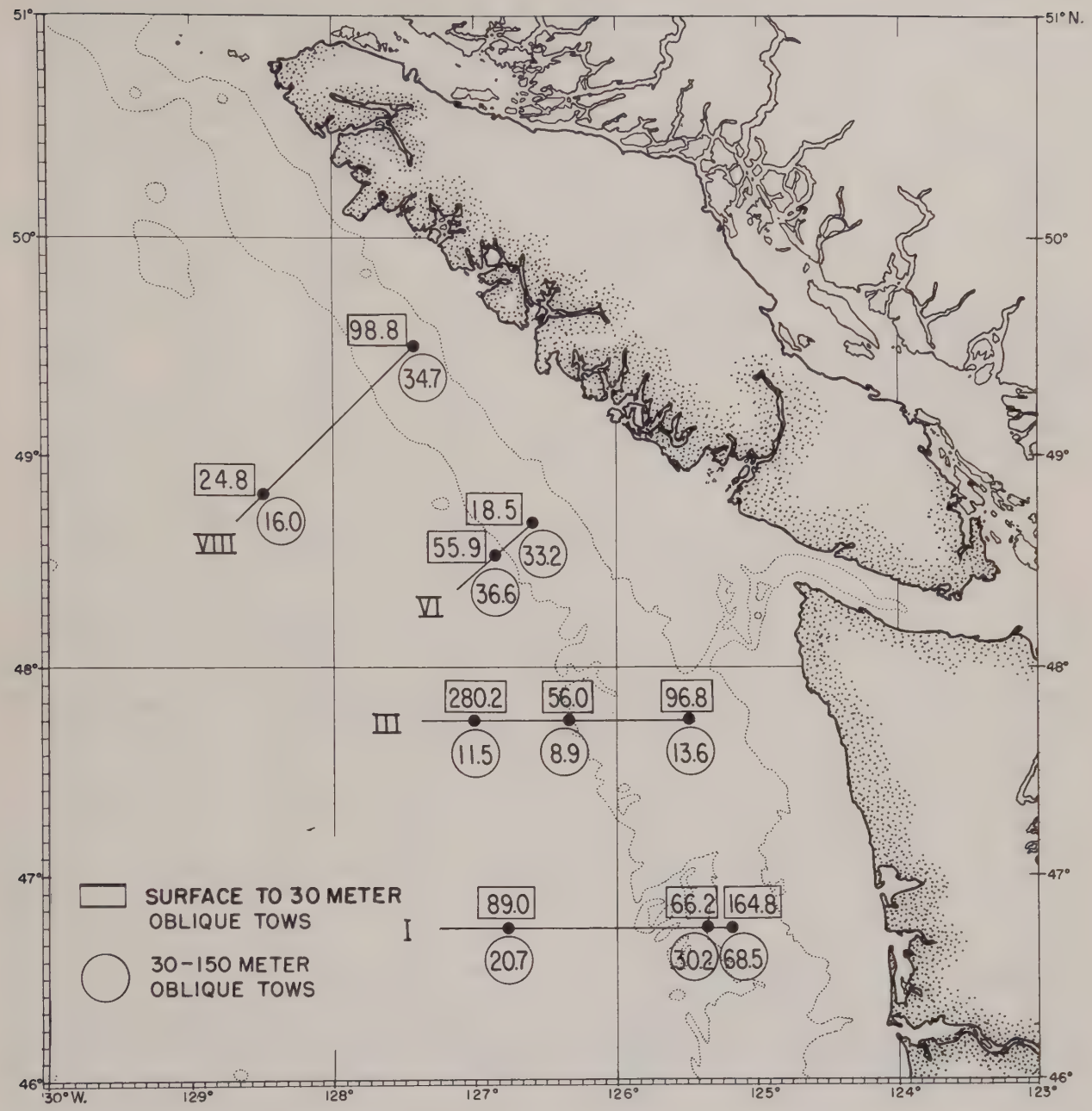

Figure 18.--Distribution of biomass in spring 1963 as wet weight in grams per 30-minute tow. (The 183- and 1,829-m. depth contours are shown.)

largest numbers occurred at 30 m. at station 8, and within the upper 30 m. at station 17 (table 6). These slight differences in distributions may have been affected by the bright moonlight during the sampling at station 8 and the absence of moonlight at station 17.

All euphausiids, with the possible exception of T. longipes were more numerous in the upper 150 m. during dusk, midnight, and dawn than at noon or afternoon. T. longipes showed evidence of vertical migration at station 17, but not at station 8 (table 7). Differences in sampling time and vertical distribution of temperature and salinity at these two stations may have affected the differences in distribution. T. longipes was found in the upper 150 m. during the afternoon at station 8, where a well-mixed surface layer, about 60 m. thick, existed above a sharp thermocline; it was not taken at station 17 at noon where these physical features were missing (fig. 19). Brinton (1962a) noted that the vertical movements of

Table 5.--Number and percentage of euphausiid species collected in spring 1963 at depth intervals of surface to 30-m. and 30- to 150-m. at stations 2, 4, 7, 8, 11, 12, 13, 16, 17, and 18

Species	Euphausiids collected		Percentage species caught in each interval		Frequency of occurrence	
	Surface-30 m.	30-150 m.	Surface-30 m.	30-150 m.	Surface-30 m.	30-150 m.
	Number	Number	Percent	Percent	Percent	Percent
Euphausia pacifica.....	14,223	2,342	86	14	100	100
Thysanoessa spinifera....	558	291	66	34	92	77
Thysanoessa longipes.....	219	331	40	60	85	100
Nematoscelis difficilis..	66	73	48	52	46	62
Tessarabrachion oculatus.	1	48	2	98	8	77
Nematobrachion flexipes..	12	15	44	56	8	38
Stylocheiron maximum.....	0	4	0	100	0	31

Table 6.--Numbers of euphausiids collected at different depths and periods of the day in horizontal tows at stations 8 and 17, spring 1963

Depth	Station 8				Station 17			
	Dusk	Midnight	Dawn	Afternoon	Dusk	Midnight	Dawn	Noon
Meters	Number	Number	Number	Number	Number	Number	Number	Number
0	0	0	0	0	7	2	0	0
10	--	--	--	--	1,672	870	704	0
15	36	12	6	8	--	--	--	--
20	--	--	--	--	1,912	531	574	0
30	192	1,012	722	45	2,352	154	1,968	0
75	124	64	546	0	190	94	692	0
150	94	48	156	17	174	86	193	47

T. longipes in the northern part of their range were different from those farther south.

The vertical distribution and migration of some of the euphausiid species differed slightly from the description by Brinton (1962a). He stated that T. spinifera was restricted to depths of less than 100 m. and showed no evidence of diurnal vertical migration, whereas we did not take adults of this species in the upper 150 m. of the water column during noon or afternoon periods. The absence of adults may indicate vertical migration or avoidance of the trawl by the animals. Brinton also found N. difficilis common in the upper 140 m. and no clear evidence of diurnal vertical migration. There was slight evidence for such movements at station 17 (table 7), however.

Other Groups

At dusk, midnight, and dawn, a substantial part of the biomass was collected at the surface at station 8 but not at station 17 (figs. 16 and 17). At station 8, the largest catch, taken from 75 m. at midnight, contained at least seven times as many crab larvae (Cancer sp.) as any of the other samples. The surface samples taken at dusk, midnight, and dawn contained 74 to 94 percent crab larvae, by number. Large concentrations of crab larvae and euphausiids were not found at the same depths (tables 6 and 8), but large numbers of crab larvae and postlarval benthic fishes (table 9) were caught together at dusk, midnight, and dawn. The fishes were from the families Scorpaenidae and Cottidae.

Table 7.--Number of euphausiids of six species collected at different depths in horizontal tows during the 24-hour sampling periods, spring 1963

Depth	Station 8				Station 17			
	Dusk	Midnight	Dawn	Afternoon	Dusk	Midnight	Dawn	Noon
Meters	Number	Number	Number	Number	Number	Number	Number	Number
				Euphausia pacifica				
0	0	0	0	0	7	2	2	0
10	--	--	--	--	1,672	868	684	0
15	7	5	0	0	--	--	--	--
20	--	--	--	--	1,892	479	490	0
30	127	958	620	0	2,336	134	1,832	0
75	43	64	492	0	141	80	598	0
150	69	20	128	0	161	74	165	45
				Thysanoessa spinifera				
0	0	0	0	0	0	0	0	0
10	--	--	--	--	0	2	20	0
15	1	5	0	0	--	--	--	--
20	--	--	--	--	16	41	80	0
30	14	46	44	0	8	6	120	0
75	7	0	10	0	3	2	82	0
150	2	0	12	0	0	7	20	0
				Thysanoessa longipes				
0	0	0	0	0	0	0	0	0
10	--	--	--	--	0	0	0	0
15	26	1	1	8	--	--	--	--
20	--	--	--	--	0	5	0	0
30	43	8	50	45	8	6	16	0
75	73	0	38	0	36	11	2	0
150	19	27	10	17	7	4	5	1
				Nematoscelis difficilis				
0	0	0	0	0	0	0	0	0
10	--	--	--	--	0	0	0	0
15	2	1	5	0	--	--	--	--
20	--	--	--	--	0	6	4	0
30	8	0	6	0	0	8	0	0
75	1	0	4	0	10	1	10	0
150	1	0	2	0	6	1	1	1
				Tessarabrachion oculatus				
0	0	0	0	0	0	0	0	0
10	--	--	--	--	0	0	0	0
15	0	0	0	0	--	--	--	--
20	--	--	--	--	0	0	0	0
30	0	0	2	0	0	0	0	0
75	0	0	2	0	0	0	0	0
150	3	0	4	0	0	0	2	0
				Nematobrachion flexipes				
0	0	0	0	0	0	0	0	0
10	--	--	--	--	0	0	0	0
15	0	0	0	0	--	--	--	--
20	--	--	--	--	4	0	0	0
30	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0

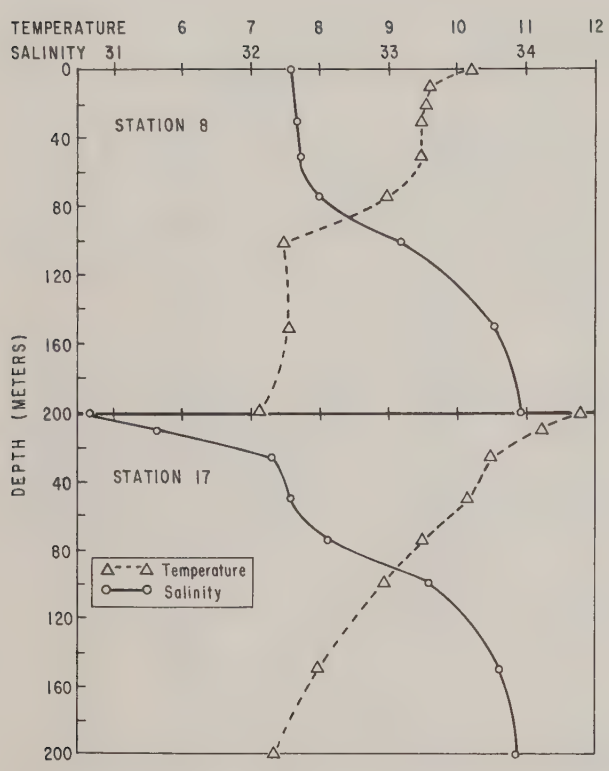

Figure 19.--Temperature and salinity profiles at stations 8 and 17, spring 1963.

Table 8.--Numbers of crab larvae (Cancer sp.) collected at different depths at station 8 during a 24-hour sampling period, spring 1963

Depth	Larvae collected			
	Dusk	Midnight	Dawn	Afternoon
Meters	Number	Number	Number	Number
0	634	1,084	1,108	1
15	55	31	36	10
30	10	204	12	49
75	47	7,728	38	2
150	14	6	112	9

Table 9.--Numbers of postlarval benthic fishes collected at different depths at station 8 during a 24-hour sampling period, spring 1963

Depth	Fishes collected			
	Dusk	Midnight	Dawn	Afternoon
Meters	Number	Number	Number	Number
0	19	29	15	0
15	6	1	2	0
30	0	3	0	1
75	5	133	3	2
150	2	2	1	1

Tarletonbeania crenularis was the only species of mesopelagic fish collected in large numbers at stations 8 and 17. About 84 percent of the total catch was taken at the surface (table 10). Similarly, Pearcy (1964) found high concentrations of this species at the surface off the coast of Oregon.

Table 10.--Numbers of Tarletonbeania crenularis collected at different depths at stations 8 and 17 during the 24-hour sampling periods, spring 1963

Depth	Station 8				Station 17			
	Dusk	Midnight	Dawn	Afternoon	Dusk	Midnight	Dawn	Noon
Meters	Number	Number	Number	Number	Number	Number	Number	Number
0	19	1	3	0	71	34	6	0
10	--	--	--	--	0	0	0	0
15	0	1	0	0	--	--	--	--
20	--	--	--	--	2	1	0	0
30	0	2	0	0	0	3	0	0
75	1	0	1	0	0	1	0	0
150	0	0	0	0	0	14	0	0

SUMMARY

1. Plankton samples from the upper 150 m. of the water column were collected in coastal waters off Vancouver Island, British Columbia, and the State of Washington in spring and fall 1963, by towing a 0.9-m. Isaacs-Kidd midwater trawl.

2. The biomass was composed of about 90 percent euphausiids, of which 76 percent, by number, were Euphausia pacifica and 14 percent were Thysanoessa spinifera.

3. Biomass was generally lowest near shore, reached a maximum at or near the outer edge of the continental shelf, and decreased again farther offshore.

4. Biomass was significantly higher in the southern part of the region than in the northern part.

5. Macrozooplanktonic and small nektonic organisms were much more abundant in the spring than in the fall. The change in biomass resulted principally from the large decrease in numbers of Euphausia pacifica and the decrease in size of E. pacifica and Thysanoessa spinifera from spring to fall.

6. Mesopelagic fishes were numerous over the continental slope but were found only occasionally at the edge of the shelf. None were caught over the continental shelf.

7. Most of the macrozooplanktonic and small nektonic organisms appeared to undergo a diurnal vertical migration of at least 150 m. at the two stations where horizontal tows were made. All the euphausiid species showed greatly diminished numbers or were completely absent from the surface to 150 m. during the day at these two stations except Thysanoessa longipes, which was found in the upper 150 m. during daylight only at the station with a sharp thermocline and well-mixed layer. Most of the macrozooplankton and small nekton were in the surface to 30-m. rather than the 30- to 150-m. interval at night.

8. Large concentrations of crab larvae and postlarval benthic fishes were taken at the surface and 75 m., but euphausiids were not abundant at these depths. The mesopelagic fish, Tarletonbeania crenularis, was caught primarily at the surface.

LITERATURE CITED

ARON, WILLIAM.
1959. Midwater trawling studies in the North Pacific. Limnol. Oceanogr. 4: 409-418.
1962. The distribution of animals in the eastern North Pacific and its relationship to physical and chemical conditions. J. Fish. Res. Bd. Can. 19: 271-314.

ARON, WILLIAM, NEWELL RAXTER, ROY NOEL, and WILLIAM ANDREWS.
1964. A description of a discrete depth plankton sampler with some notes on the towing behavior of a 6-foot Isaacs-Kidd mid-water trawl and a one-meter ring net. Limnol. Oceanogr. 9: 324-333.

BANNER, ALBERT H.
1947. A taxonomic study of the Mysidacea and Euphausiacea (Crustacea) of the North Pacific. Part I, Mysidacea. Trans. Roy. Can. Inst. 26: 345-414.
1948. A taxonomic study of the Mysidacea and Euphausiacea (Crustacea) of the North Pacific. Part II, Mysidacea. Trans. Roy. Can. Inst. 27: 65-125.
1949. A taxonomic study of the Mysidacea and Euphausiacea (Crustacea) of the North Pacific. Part III, Euphausiacea. Trans. Roy. Can. Inst. 28: 2-49.

BODEN, BRIAN P., MARTIN W. JOHNSON, and EDWARD BRINTON.
1955. The Euphausiacea (Crustacea) of the North Pacific. Scripps Inst. Oceanogr., Bull. 6(8): 287-400.

BRINTON, EDWARD.
1962a. The distribution of Pacific euphausiids. Scripps Inst. Oceanogr., Bull. 8(2): 51-270.
1962b. Two new species of Euphausiacea, Euphausia nana and Stylocheiron robustum from the Pacific. Crustaceana 4: 167-179.

DOE, L. A. E.
1955. Offshore waters of the Canadian Pacific coast. J. Fish. Res. Bd. Can. 12: 1-34.

HEBARD, JAMES FRANK.
1966. Distribution of Euphausiacea and Copepoda off Oregon in relation to oceanographic conditions. Ph. D. Thesis, Oregon State University, Corvallis, 84 pp.

INGRAHAM, W. JAMES, JR.
1967. The geostrophic circulation and distribution of water properties off the coasts of Vancouver Island and Washington, spring and fall 1963. U.S. Fish Wildl. Serv., Fish. Bull. 66: 223-250.

ISAACS, JOHN D., and LEWIS W. KIDD.
1953. Isaacs-Kidd midwater trawl. Univ. Calif., Scripps Inst. Oceanogr., Equip. Rep. 1 (S.I.O. Ref. 53-3), 18 + (3) pp. [Processed.]

McEWEN, G. F., M. W. JOHNSON, and TH. R. FOLSOM.
1954. A statistical analysis of the performance of the Folsom plankton sample splitter, based upon test observations. Arch. Meteorol. Geophys. Bioklimatol., Ser. A Meteorol. Geophys. 7: 502-527.

MEDNIKOV, B. M.
1958. O planktone severo-zapadnoĭ chasti Tikhogo okeana (On the plankton of the northwestern part of the Pacific Ocean). In Materialy po biologii morskogo perioda zhizni Dalnevostochnykh lososeĭ, p. 76-86. Vses. Nauch.-issled. Inst. Morsk. Ryb. Khoz. Okeanogr., Moscow. [Fisheries Research Board of Canada Translation Series 183.]

PEARCY, WILLIAM G.
1964. Some distributional features of mesopelagic fishes off Oregon. J. Mar. Res. 22: 83-102.

PEARCY, WILLIAM G., and R. M. LAURS.
1966. Vertical migration and distribution of mesopelagic fishes off Oregon. Deep-Sea Res. 13: 153-165.

REID, JOSEPH L., JR.
1962. On circulation, phosphate-phosphorus content, and zooplankton volumes in the upper part of the Pacific Ocean. Limnol. Oceanogr. 7: 287-306.

ST. JOHN, P. A.
1958. A volumetric study of zooplankton distribution in the Cape Hatteras area. Limnol. Oceanogr. 3: 387-397.

APPENDIX

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963

Station:	1		2	
Position:	49°35' N. 127°19' W. 49°34' N. 127°20' W.		49°32' N. 127°23' W. 49°30' N. 127°26' W.	
Date:	3 May 1963		4 May 1963	
Sample number:	1		2	
Time (P.D.T.):	2320-2400		0020-0100	
Sample depth (m.):	30 to surface		150 to 30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	2,704	89.5	224	65.6
Copepoda	276	9.1	8	2.4
Crustacean larvae	16	0.5	1	0.3
Chaetognatha	8	0.3	24	7.0
Cnidaria	4	0.1	15	4.4
Pisces	5	0.2	2	0.6
Amphipoda	4	0.1	10	2.9
Pisces, eggs	4	0.1	1	0.3
Pteropoda	-	-	46	13.5
Sergestidae	-	-	8	2.4
Ctenophora	-	-	2	0.6
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	3,021	99.9	341	100.0
EUPHAUSIACEA				
Euphausia pacifica	132	4.9	50	22.3
Thysanoessa spinifera	2,568	95.0	160	71.4
Thysanoessa longipes	4	0.1	7	3.1
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	7	3.1
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	2,704	100.0	224	99.9
PISCES				
Lampanyctus leucopsarus	4	80.0	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	1	20.0	1	50.0
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	1	50.0
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	5	100.0	2	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	2		3	
Position:	49°30' N. 127°26' W. 49°32' N. 127°23' W.		49°24' N. 127°36' W. 49°22'05" N. 127°39' W.	
Date:	4 May 1963		4 May 1963	
Sample number:	3		4	
Time (P.D.T.):	0120-0155		0320-0355	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,168	85.6	652	78.4
Copepoda	152	11.1	72	8.7
Crustacean larvae	-	-	6	0.7
Chaetognatha	4	0.3	2	0.2
Cnidaria	12	0.9	52	6.3
Pisces	8	0.6	16	1.9
Amphipoda	4	0.3	4	0.5
Pisces, eggs	8	0.6	12	1.4
Pteropoda	-	-	-	-
Sergestidae	-	-	12	1.4
Ctenophora	4	0.3	-	-
Cephalopoda	4	0.3	2	0.2
Annelida	-	-	2	0.2
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	1,364	100.0	832	99.9
EUPHAUSIACEA				
Euphausia pacifica	136	11.6	496	76.1
Thysanoessa spinifera	1,012	86.6	144	22.1
Thysanoessa longipes	20	1.7	12	1.8
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	1,168	99.9	652	100.0
PISCES				
Lampanyctus leucopsarus	6	75.0	13	81.3
Tarletonbeania crenularis	-	-	1	6.2
Ammodytes hexapterus	2	25.0	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	2	12.5
Total	8	100.0	16	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--contined

Station:	4		4	
Position:	48°49' N. 128°30' W. 48°49' N. 128°33' W.		48°49' N. 128°33' W. 48°52' N. 128°30' W.	
Date:	6 May 1963		7 May 1963	
Sample number:	5		6	
Time (P.D.T.):	2313-2347		0320-0359	
Sample depth (m.):	30 to surface		150 to 30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	194	26.8	187	55.5
Copepoda	214	29.6	29	8.6
Crustacean larvae	17	2.4	17	5.0
Chaetognatha	10	1.4	28	8.3
Cnidaria	267	36.9	56	16.6
Pisces	1	0.1	1	0.3
Amphipoda	3	0.4	8	2.4
Pisces, eggs	6	0.8	1	0.3
Pteropoda	2	0.3	4	1.2
Sergestidae	5	0.7	1	0.3
Ctenophora	1	0.1	-	-
Cephalopoda	1	0.1	3	0.9
Annelida	2	0.3	2	0.6
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	723	99.9	337	100.0
EUPHAUSIACEA				
Euphausia pacifica	173	89.2	155	82.9
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	21	10.8	27	14.4
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	3	1.6
Nematobrachion flexipes	-	-	2	1.1
Stylocheiron maximum	-	-	-	-
Total	194	100.0	187	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	1	100.0	1	100.0
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	1	100.00	1	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	5		6	
Position:	49°01' N. 126°03' W. 48°58' N. 126°05' W.		48°49' N. 126°24' W. 48°47' N. 126°26' W.	
Date:	7 May 1963		8 May 1963	
Sample number:	7		8	
Time (P.D.T.):	2207-2241		0049-0123	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	21,888	99.5
Copepoda	10	27.8	64	0.3
Crustacean larvae	10	27.8	-	-
Chaetognatha	-	-	-	-
Cnidaria	14	38.9	32	0.2
Pisces	2	5.5	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	36	100.0	21,984	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	21,632	98.8
Thysanoessa spinifera	-	-	256	1.2
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	0	-	21,888	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	1	50.0	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	1	50.0	-	-
Total	2	100.0	0	-

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	7		7	
Position:	48°42' N. 126°34' W. 48°40' N. 126°37' W.		48°40' N. 126°37' W. 48°42' N. 126°34' W.	
Date:	8 May 1963		8 May 1963	
Sample number:	9		10	
Time (P.D.T.):	0233-0307		0312-0355	
Sample depth (m.):	30 to surface		150 to 30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	156	34.7	398	55.5
Copepoda	7	1.6	56	7.8
Crustacean larvae	21	4.7	4	0.6
Chaetognatha	1	0.2	93	13.0
Cnidaria	233	51.8	111	15.5
Pisces	7	1.6	9	1.2
Amphipoda	-	-	5	0.7
Pisces, eggs	10	2.2	3	0.4
Pteropoda	5	1.1	8	1.1
Sergestidae	4	0.9	8	1.1
Ctenophora	-	-	-	-
Cephalopoda	5	1.1	12	1.7
Annelida	1	0.2	9	1.2
Caridea	-	-	1	0.1
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	450	100.1	717	99.9
EUPHAUSIACEA				
Euphausia pacifica	136	87.2	312	78.4
Thysanoessa spinifera	12	7.7	16	4.0
Thysanoessa longipes	7	4.5	68	17.1
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	1	0.6	1	0.2
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	1	0.2
Total	156	100.0	398	99.9
PISCES				
Lampanyctus leucopsarus	-	-	1	11.1
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	14.3	1	11.1
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	6	85.7	7	77.8
Total	7	100.0	9	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°32' N. 126°52' W.		48°32' N. 126°52' W. 48°33' N. 126°50' W.	
Date:	10 May 1963		10 May 1963	
Sample number:	32		33	
Time (P.D.T.):	0016-0055		0059-0131	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	362	38.6	650	47.1
Copepoda	138	14.7	246	17.8
Crustacean larvae	34	3.6	212	15.4
Chaetognatha	134	14.3	46	3.3
Cnidaria	60	6.4	140	10.1
Pisces	15	1.6	11	0.8
Amphipoda	6	0.6	8	0.6
Pisces, eggs	6	0.6	20	1.4
Pteropoda	128	13.6	12	0.9
Sergestidae	28	3.0	18	1.3
Ctenophora	2	0.2	-	-
Cephalopoda	24	2.6	14	1.0
Annelida	2	0.2	4	0.3
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	939	100.0	1,381	100.0
EUPHAUSIACEA				
Euphausia pacifica	292	80.7	630	96.9
Thysanoessa spinifera	6	1.7	10	1.5
Thysanoessa longipes	60	16.6	6	0.9
Nematoscelis difficilis	-	-	4	0.6
Tessarabrachion oculatus	2	0.6	-	-
Nematobrachion flexipes	2	0.6	-	-
Stylocheiron maximum	-	-	-	-
Total	362	100.2	650	99.9
PISCES				
Lampanyctus leucopsarus	6	40.0	2	18.2
Tarletonbeania crenularis	1	6.7	3	27.3
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	1	9.1
Electrona arctica	-	-	-	-
Tactostoma macropus	1	6.7	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	7	46.7	5	45.4
Total	15	100.1	11	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	9		10	
Position:	47°45' N. 124°42' W. 47°45' N. 124°43' W.		47°45' N. 125°04' W. 47°45' N. 125°06' W.	
Date:	11 May 1963		12 May 1963	
Sample number:	34		35	
Time (P.D.T.):	2200-2233		0008-0042	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	3	1.2	14,976	98.1
Copepoda	15	6.1	96	0.6
Crustacean larvae	89	36.0	160	1.1
Chaetognatha	-	-	32	0.2
Cnidaria	1	0.4	-	-
Pisces	3	1.2	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	1	0.4	-	-
Ctenophora	133	53.8	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	2	0.8	-	-
Thaliacea	-	-	-	-
Total	247	99.9	15,264	100.0
EUPHAUSIACEA				
Euphausia pacifica	3	100.0	13,984	93.4
Thysanoessa spinifera	-	-	992	6.6
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	3	100.0	14,976	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	3	100.0	-	-
Total	3	100.0	0	-

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	11		11	
Position:	47°45' N. 125°28' W. 47°45' N. 125°30' W.		47°45' N. 125°30' W. 47°45' N. 125°28' W.	
Date:	12 May 1963		12 May 1963	
Sample number:	36		37	
Time (P.D.T.):	0224-0303		0304-0339	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	158	47.2	1,736	84.4
Copepoda	40	11.9	188	9.1
Crustacean larvae	7	2.1	4	0.2
Chaetognatha	41	12.2	24	1.2
Cnidaria	48	14.3	44	2.1
Pisces	3	0.9	12	0.6
Amphipoda	5	1.5	20	1.0
Pisces, eggs	5	1.5	-	-
Pteropoda	7	2.1	16	0.8
Sergestidae	7	2.1	-	-
Ctenophora	-	-	-	-
Cephalopoda	-	-	8	0.4
Annelida	14	4.2	4	0.2
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	335	100.0	2,056	100.0
EUPHAUSIACEA				
Euphausia pacifica	126	79.8	1,648	94.9
Thysanoessa spinifera	7	4.4	76	4.4
Thysanoessa longipes	17	10.8	12	0.7
Nematoscelis difficilis	2	1.3	-	-
Tessarabrachion oculatus	4	2.5	-	-
Nematobrachion flexipes	1	0.6	-	-
Stylocheiron maximum	1	0.6	-	-
Total	158	100.0	1,736	100.0
PISCES				
Lampanyctus leucopsarus	2	66.7	11	91.7
Tarletonbeania crenularis	-	-	1	8.3
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	1	33.3	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	3	100.0	12	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	12		12	
Position:	47°45' N. 126°20' W. 47°45' N. 126°19' W.		47°45' N. 126°19' W. 47°45' N. 126°20' W.	
Date:	12 May 1963		12 May 1963	
Sample number:	38		39	
Time (P.D.T.):	2215-2255		2258-2330	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	40	16.1	1,042	74.0
Copepoda	14	5.6	34	2.4
Crustacean larvae	6	2.4	6	0.4
Chaetognatha	99	39.9	16	1.1
Cnidaria	38	15.3	234	16.6
Pisces	8	3.2	15	1.1
Amphipoda	13	5.2	8	0.6
Pisces, eggs	3	1.2	14	1.0
Pteropoda	17	6.9	4	0.3
Sergestidae	3	1.2	18	1.3
Ctenophora	-	-	-	-
Cephalopoda	1	0.4	4	0.3
Annelida	4	1.6	6	0.4
Caridea	1	0.4	-	-
Cumacea	-	-	-	-
Thaliacea	1	0.4	8	0.6
Total	248	99.8	1,409	100.1
EUPHAUSIACEA				
Euphausia pacifica	30	75.0	1,012	97.1
Thysanoessa spinifera	3	7.5	16	1.5
Thysanoessa longipes	5	12.5	10	1.0
Nematoscelis difficilis	2	5.0	4	0.4
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	40	100.0	1,042	100.0
PISCES				
Lampanyctus leucopsarus	3	37.5	11	73.3
Tarletonbeania crenularis	-	-	2	13.3
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	12.5	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	1	12.5	-	-
Diaphus theta	-	-	1	6.7
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	3	37.5	1	6.7
Total	8	100.0	15	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	12		12	
Position:	47°45' N. 126°20' W. 47°45' N. 126°19' W.		47°45' N. 126°19' W. 47°45' N. 126°21' W.	
Date:	12, 13 May 1963		13 May 1963	
Sample number:	40		41	
Time (P.D.T.):	2349-0028		0031-0106	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	96	29.4	992	69.6
Copepoda	10	3.1	8	0.6
Crustacean larvae	7	2.2	4	0.3
Chaetognatha	92	28.2	28	2.0
Cnidaria	85	26.1	328	23.0
Pisces	4	1.2	6	0.4
Amphipoda	3	0.9	8	0.6
Pisces, eggs	2	0.6	28	2.0
Pteropoda	17	5.2	8	0.6
Sergestidae	3	0.9	16	1.1
Ctenophora	-	-	-	-
Cephalopoda	4	1.2	-	-
Annelida	2	0.6	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	1	0.3	-	-
Total	326	99.9	374	100.2
EUPHAUSIACEA				
Euphausia pacifica	80	83.3	844	85.1
Thysanoessa spinifera	3	3.1	56	5.6
Thysanoessa longipes	3	3.1	80	8.1
Nematoscelis difficilis	1	1.0	12	1.2
Tessarabrachion oculatus	8	8.3	-	-
Nematobrachion flexipes	1	1.0	-	-
Stylocheiron maximum	-	-	-	-
Total	96	99.8	992	100.0
PISCES				
Lampanyctus leucopsarus	3	75.0	1	16.7
Tarletonbeania crenularis	-	-	1	16.7
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	3	50.0
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	1	25.0	1	16.7
Total	4	100.0	6	100.1

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	12		12	
Position:	47°45' N. 126°21' W. 47°45' N. 126°19' W.		47°45' N. 126°19' W. 47°45' N. 126°21' W.	
Date:	13 May 1963		13 May 1963	
Sample number:	42		43	
Time (P.D.T.):	0135-0214		0216-0251	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	62	16.6	776	65.6
Copepoda	28	7.5	42	3.6
Crustacean larvae	7	1.9	8	0.7
Chaetognatha	110	29.4	82	6.9
Cnidaria	84	22.5	198	16.7
Pisces	6	1.6	12	1.0
Amphipoda	8	2.1	8	0.7
Pisces, eggs	-	-	12	1.0
Pteropoda	61	16.3	8	0.7
Sergestidae	5	1.3	14	1.2
Ctenophora	-	-	4	0.3
Cephalopoda	2	0.5	2	0.2
Annelida	1	0.3	16	1.4
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	374	100.0	1,182	100.0
EUPHAUSIACEA				
Euphausia pacifica	44	71.0	676	87.1
Thysanoessa spinifera	1	1.6	70	9.0
Thysanoessa longipes	7	11.3	24	3.1
Nematoscelis difficilis	3	4.8	6	0.8
Tessarabrachion oculatus	7	11.3	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	62	100.0	776	100.0
PISCES				
Lampanyctus leucopsarus	-	-	6	50.0
Tarletonbeania crenularis	1	16.7	3	25.0
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	1	16.7	-	-
Tactostoma macropus	2	33.3	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	33.3	3	25.0
Total	6	100.0	12	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	12		12	
Position:	47°45' N. 126°21' W. 47°45' N. 126°19' W.		47°45' N. 126°19' W. 47°45' N. 126°21' W.	
Date:	13 May 1963		13 May 1963	
Sample number:	44		45	
Time (P.D.T.):	0318-0355		0358-0431	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	67	20.4	744	46.4
Copepoda	16	4.9	44	2.7
Crustacean larvae	16	4.9	8	0.5
Chaetognatha	107	32.6	116	7.2
Cnidaria	50	15.2	608	37.9
Pisces	8	2.5	7	0.4
Amphipoda	2	0.6	4	0.3
Pisces, eggs	2	0.6	16	1.0
Pteropoda	46	14.0	8	0.5
Sergestidae	6	1.8	32	2.0
Ctenophora	-	-	4	0.3
Cephalopoda	2	0.6	4	0.3
Annelida	6	1.8	8	0.5
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	328	99.9	1,603	100.0
EUPHAUSIACEA				
Euphausia pacifica	45	67.2	704	94.6
Thysanoessa spinifera	6	9.0	32	4.3
Thysanoessa longipes	14	20.9	8	1.1
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	1	1.5	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	1	1.5	-	-
Total	67	100.1	744	100.0
PISCES				
Lampanyctus leucopsarus	1	12.5	-	-
Tarletonbeania crenularis	2	25.0	2	28.6
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	3	37.5	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	1	12.5	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	1	12.5	5	71.4
Total	8	100.0	7	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	13		13	
Position:	47°45' N. 127°00' W. 47°45' N. 126°59' W.		47°45' N. 126°59' W. 47°45' N. 127°00' W.	
Date:	13 May 1963		13 May 1963	
Sample number:	46		47	
Time (P.D.T.):	2206-2243		2245-2319	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	112	20.8	5,072	72.7
Copepoda	71	13.2	400	5.7
Crustacean larvae	9	1.7	-	-
Chaetognatha	83	15.4	64	0.9
Cnidaria	177	32.9	1,056	15.1
Pisces	8	1.5	20	0.3
Amphipoda	5	0.9	16	0.2
Pisces, eggs	4	0.7	16	0.2
Pteropoda	32	6.0	96	1.4
Sergestidae	33	6.1	224	3.2
Ctenophora	1	0.2	-	-
Cephalopoda	3	0.6	16	0.2
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	538	100.0	6,980	99.9
EUPHAUSIACEA				
Euphausia pacifica	43	38.4	5,040	99.4
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	17	15.2	-	-
Nematoscelis difficilis	45	40.2	32	0.6
Tessarabrachion oculatus	7	6.2	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	112	100.0	5,072	100.0
PISCES				
Lampanyctus leucopsarus	3	37.5	10	50.0
Tarletonbeania crenularis	2	25.0	7	35.0
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	12.5	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	1	12.5	-	-
Larval and post-larval fish	1	12.5	3	15.0
Total	8	100.0	20	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	14		15	
Position:	46°45' N. 124°19' W. 46°45' N. 124°20' W.		46°45' N. 124°46' W. 46°45' N. 124°48' W.	
Date:	14 May 1963		15 May 1963	
Sample number:	48		49	
Time (P.D.T.):	2202-2236		0039-0112	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	6	5.9	29,440	98.7
Copepoda	13	12.9	192	0.6
Crustacean larvae	29	28.7	-	-
Chaetognatha	1	1.0	-	-
Cnidaria	4	4.0	192	0.6
Pisces	-	-	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	1	1.0	-	-
Ctenophora	47	46.5	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	101	100.0	29,824	99.9
EUPHAUSIACEA				
Euphausia pacifica	6	100.0	28,480	96.7
Thysanoessa spinifera	-	-	960	3.3
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	6	100.0	29,440	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	0	-

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	16		16	
Position:	46°45' N. 125°10' W. 46°45' N. 125°12' W.		46°45' N. 125°12' W. 46°45' N. 125°10' W.	
Date:	15 May 1963		15 May 1963	
Sample number:	50		51	
Time (P.D.T.):	0257-0330		0332-0410	
Sample depth (m.):	30 to surface		150 to 30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	2,532	82.9	856	82.9
Copepoda	392	12.8	82	7.9
Crustacean larvae	56	1.8	26	2.5
Chaetognatha	-	-	2	0.2
Cnidaria	32	1.1	26	2.5
Pisces	11	0.4	2	0.2
Amphipoda	8	0.3	18	1.7
Pisces, eggs	-	-	-	-
Pteropoda	4	0.1	-	-
Sergestidae	16	0.5	8	0.8
Ctenophora	-	-	-	-
Cephalopoda	-	-	12	1.2
Annelida	4	0.1	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	3,055	100.0	1,032	99.9
EUPHAUSIACEA				
Euphausia pacifica	2,448	96.7	744	86.9
Thysanoessa spinifera	84	3.3	58	6.8
Thysanoessa longipes	-	-	42	4.9
Nematoscelis difficilis	-	-	12	1.4
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	2,532	100.0	856	100.0
PISCES				
Lampanyctus leucopsarus	2	18.2	-	-
Tarletonbeania crenularis	5	45.4	1	50.0
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	1	9.1	-	-
Diaphus theta	1	9.1	-	-
Lampanyctus ritteri	-	-	1	50.0
Larval and post-larval fish	2	18.2	-	-
Total	11	100.0	2	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°19' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	15 May 1963		15 May 1963	
Sample number:	58		65	
Time (P.D.T.):	2313-2353		0250-0323	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	478	79.1	928	74.5
Copepoda	65	10.8	128	10.3
Crustacean larvae	15	2.5	84	6.7
Chaetognatha	1	0.2	8	0.6
Cnidaria	19	3.1	40	3.2
Pisces	8	1.3	6	0.5
Amphipoda	9	1.5	16	1.3
Pisces, eggs	-	-	4	0.3
Pteropoda	2	0.3	4	0.3
Sergestidae	5	0.8	12	1.0
Ctenophora	-	-	-	-
Cephalopoda	1	0.2	-	-
Annelida	1	0.2	16	1.3
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	604	100.0	1,246	100.0
EUPHAUSIACEA				
Euphausia pacifica	418	87.4	748	80.6
Thysanoessa spinifera	31	6.5	176	19.0
Thysanoessa longipes	25	5.2	4	0.4
Nematoscelis difficilis	4	0.8	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	478	99.9	928	100.0
PISCES				
Lampanyctus leucopsarus	4	50.0	1	16.7
Tarletonbeania crenularis	2	25.0	5	83.3
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	1	12.5	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	1	12.5	-	-
Total	8	100.0	6	100.0

Appendix Table 1.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, spring 1963--continued

Station:	18		18	
Position:	46°45' N. 126°45' W. 46°44' N. 126°45' W.		46°44' N. 126°45' W. 46°45' N. 126°45' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	78		79	
Time (P.D.T.):	2210-2249		2250-2324	
Sample depth (m.):	150 to 30		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	40	12.6	96	3.4
Copepoda	34	10.7	36	1.3
Crustacean larvae	3	1.0	-	-
Chaetognatha	78	24.6	40	1.4
Cnidaria	81	25.6	616	22.0
Pisces	6	1.9	14	0.5
Amphipoda	13	4.1	16	0.6
Pisces, eggs	4	1.3	32	1.1
Pteropoda	22	6.9	16	0.6
Sergestidae	32	10.1	1,876	67.0
Ctenophora	-	-	-	-
Cephalopoda	-	-	4	0.1
Annelida	2	0.6	56	2.0
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	2	0.6	-	-
Total	317	100.0	2,802	100.0
EUPHAUSIACEA				
Euphausia pacifica	3	7.5	28	29.2
Thysanoessa spinifera	-	-	4	4.2
Thysanoessa longipes	22	55.0	44	45.8
Nematoscelis difficilis	4	10.0	8	8.3
Tessarabrachion oculatus	8	20.0	-	-
Nematobrachion flexipes	2	5.0	12	12.5
Stylocheiron maximum	1	2.5	-	-
Total	40	100.0	96	100.0
PISCES				
Lampanyctus leucopsarus	1	16.7	2	14.3
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	2	14.3
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	5	83.3	10	71.4
Total	6	100.0	14	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963

Station:	1		2	
Position:	46°45' N. 124°18' W. 46°45' N. 124°19.5' W.		46°45' N. 124°47' W. 46°45' N. 124°46' W.	
Date:	29 Oct. 1963		29 Oct. 1963	
Sample number:	1		2	
Time (P.D.T.):	0110-0145		1929-2003	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	23,616	100.0
Copepoda	1	0.6	-	-
Crustacean larvae	-	-	-	-
Chaetognatha	-	-	-	-
Cnidaria	7	4.1	-	-
Pisces	1	0.6	1	1/ 0.0
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	1	0.6	-	-
Annelida	-	-	-	-
Caridea	6	3.5	-	-
Thaliacea	-	-	-	-
Mysidacea	155	90.6	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	171	100.0	23,617	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	17,088	72.4
Thysanoessa spinifera	-	-	6,528	27.6
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	23,616	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	1	100.0	-	-
Cololabis saira	-	-	1	100.0
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	1	100.0	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	3		4	
Position:	46°45' N. 125°11' W. 46°45' N. 125°08' W.		47°15' N. 124°29.7' W. 47°15' N. 124°30.3' W.	
Date:	30 Oct. 1963		5 Nov. 1963	
Sample number:	3		4	
Time (P.D.T.):	0448-0522		2120-2156	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	300	56.0	4	0.5
Copepoda	2	0.4	-	-
Crustacean larvae	1	0.2	1	0.1
Chaetognatha	78	14.5	-	-
Cnidaria	2	0.4	802	96.5
Pisces	6	1.1	1	0.1
Amphipoda	37	6.9	4	0.5
Pisces, eggs	3	0.6	-	-
Pteropoda	3	0.6	-	-
Sergestidae	102	19.0	1	0.1
Cephalopoda	-	-	-	-
Annelida	1	0.2	-	-
Caridea	-	-	1	0.1
Thaliacea	1	0.2	-	-
Mysidacea	-	-	17	2.0
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	536	100.1	831	99.9
EUPHAUSIACEA				
Euphausia pacifica	271	90.3	2	50.0
Thysanoessa spinifera	24	8.0	2	50.0
Nematoscelis difficilis	2	0.7	-	-
Thysanoessa longipes	2	0.7	-	-
Nematobrachion flexipes	1	0.3	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	300	100.0	4	100.0
PISCES				
Lampanyctus leucopsarus	1	16.7	-	-
Tarletonbeania crenularis	1	16.7	-	-
Diaphus theta	2	33.3	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	2	33.3	1	100.0
Unidentified	-	-	-	-
Total	6	100.0	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	5		6	
Position:	47°15' N. 124° 44' W. 47°15' N. 124°44.7' W.		47°15' N. 124°51' W. 47°15' N. 124°53' W.	
Date:	5 Nov. 1963		6 Nov. 1963	
Sample number:	5		6	
Time (P.D.T.):	2300-2337		2400-0035	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,172	93.3	6,816	99.6
Copepoda	-	-	-	-
Crustacean larvae	-	-	-	-
Chaetognatha	16	1.3	16	0.2
Cnidaria	68	5.4	8	0.1
Pisces	-	-	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	1,256	100.0	6,840	99.9
EUPHAUSIACEA				
Euphausia pacifica	1,024	87.4	6,800	99.8
Thysanoessa spinifera	148	12.6	16	0.2
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1,172	100.0	6,816	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	7		8	
Position:	47°15' N. 125°09' W. 47°15' N. 125°11' W.		47°15' N. 126°21' W. 47°15.5' N. 126°18.5' W.	
Date:	6 Nov. 1963		7 Nov. 1963	
Sample number:	7		8	
Time (P.D.T.):	0148-0223		0022-0055	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,240	87.3	1,042	98.5
Copepoda	32	2.2	4	0.4
Crustacean larvae	-	-	-	-
Chaetognatha	72	5.1	2	0.2
Cnidaria	44	3.1	1	0.1
Pisces	5	0.4	1	0.1
Amphipoda	28	2.0	6	0.6
Pisces, eggs	-	-	2	0.2
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	1,421	100.1	1,058	100.1
EUPHAUSIACEA				
Euphausia pacifica	152	12.3	404	38.8
Thysanoessa spinifera	1,080	87.1	636	61.0
Nematoscelis difficilis	4	0.3	-	-
Thysanoessa longipes	4	0.3	-	-
Nematobrachion flexipes	-	-	2	0.2
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1,240	100.0	1,042	100.0
PISCES				
Lampanyctus leucopsarus	2	40.0	-	-
Tarletonbeania crenularis	1	20.0	1	100.0
Diaphus theta	1	20.0	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	20.0	-	-
Unidentified	-	-	-	-
Total	5	100.0	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	9		9	
Position:	47°45' N. 124°42' W. 47°45' N. 124°42.7' W.		47°45' N. 124°42.7 W. 47°44.5' N. 124°42' W.	
Date:	8 Nov. 1963		8 Nov. 1963	
Sample number:	9		10	
Time (P.D.T.):	1911-1945		1949-2022	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	-	-
Copepoda	10	24.4	3	18.8
Crustacean larvae	2	4.9	2	12.5
Chaetognatha	3	7.3	2	12.5
Cnidaria	16	39.0	7	43.8
Pisces	1	2.4	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	1	2.4	-	-
Thaliacea	-	-	-	-
Mysidacea	8	19.5	2	12.5
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	41	99.9	16	100.1
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	0	-
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	1	100.0	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	10		10	
Position:	47°45' N. 124°57' W. 47°45.5' N. 124°56.8' W.		47°45.5' N. 124°56.8' W. 47°45' N. 124°57.2' W.	
Date:	8 Nov. 1963		8 Nov. 1963	
Sample number:	11		12	
Time (P.D.T.):	2127-2200		2202-2236	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,492	97.9	704	97.2
Copepoda	-	-	2	0.3
Crustacean larvae	-	-	4	0.6
Chaetognatha	-	-	-	-
Cnidaria	32	2.1	8	1.1
Pisces	-	-	2	0.3
Amphipoda	-	-	-	-
Pisces, eggs	-	-	4	0.6
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	1,524	100.0	724	100.1
EUPHAUSIACEA				
Euphausia pacifica	1,480	99.2	696	98.9
Thysanoessa spinifera	12	0.8	8	1.1
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1,492	100.0	704	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	2	100.0
Unidentified	-	-	-	-
Total	0	-	2	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	11		11	
Position:	47°45' N. 125°03.5' W. 47°45' N. 125°03' W.		47°45' N. 125°03' W. 47°45' N. 125°04' W.	
Date:	9 Nov. 1963		9 Nov. 1963	
Sample number:	13		14	
Time (P.D.T.):	2315-2348		2357-0030	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	3,744	100.0	1,572	97.3
Copepoda	-	-	-	-
Crustacean larvae	-	-	-	-
Chaetognatha	-	-	4	0.2
Cnidaria	-	-	36	2.2
Pisces	1	1/ 0.0	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	4	0.2
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	3,745	100.0	1,616	99.9
EUPHAUSIACEA				
Euphausia pacifica	3,712	99.1	1,564	99.5
Thysanoessa spinifera	32	0.9	8	0.5
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	3,744	100.0	1,572	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	12		12	
Position:	47°45' N. 125°28' W. 47°45' N. 125°29.5' W.		47°45' N. 125°29.5' W. 47°45' N. 125°28' W.	
Date:	9 Nov. 1963		9 Nov. 1963	
Sample number:	15		16	
Time (P.D.T.):	0212-0246		0250-0323	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	726	92.7	514	92.1
Copepoda	-	-	7	1.2
Crustacean larvae	-	-	-	-
Chaetognatha	-	-	1	0.2
Cnidaria	21	2.7	21	3.8
Pisces	5	0.6	1	0.2
Amphipoda	18	2.3	8	1.4
Pisces, eggs	4	0.5	3	0.5
Pteropoda	1	0.1	-	-
Sergestidae	8	1.0	3	0.5
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	783	99.9	558	99.9
EUPHAUSIACEA				
Euphausia pacifica	46	6.3	56	10.9
Thysanoessa spinifera	673	92.7	448	87.2
Nematoscelis difficilis	5	0.7	4	0.8
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	2	0.3	6	1.2
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	726	100.0	514	100.1
PISCES				
Lampanyctus leucopsarus	2	40.0	1	100.0
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	3	60.0	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	5	100.0	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	13		13	
Position:	47°45' N. 126°47' W. 47°45' N. 126°47.2' W.		47°44.6' N. 126°47.2' W. 47°45' N. 126°46.7' W.	
Date:	9 Nov. 1963		9 Nov. 1963	
Sample number:	17		18	
Time (P.D.T.):	2204-2239		2240-2316	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	248	64.2	226	69.3
Copepoda	10	2.6	2	0.6
Crustacean larvae	-	-	1	0.3
Chaetognatha	9	2.3	9	2.8
Cnidaria	31	8.0	7	2.1
Pisces	18	4.7	9	2.8
Amphipoda	14	3.6	31	9.5
Pisces, eggs	6	1.6	2	0.6
Pteropoda	-	-	1	0.3
Sergestidae	47	12.2	38	11.7
Cephalopoda	3	0.8	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	386	100.0	326	100.0
EUPHAUSIACEA				
Euphausia pacifica	112	45.2	74	32.7
Thysanoessa spinifera	121	48.8	144	63.7
Nematoscelis difficilis	2	0.8	2	0.9
Thysanoessa longipes	9	3.6	6	2.7
Nematobrachion flexipes	4	1.6	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	248	100.0	226	100.0
PISCES				
Lampanyctus leucopsarus	17	94.4	6	66.7
Tarletonbeania crenularis	1	5.6	2	22.2
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	1	11.1
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	18	100.0	9	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	14		14	
Position:	47°45' N. 126°16' W. 47°45' N. 126°14' W.		47°45' N. 126°14' W. 47°45' N. 126°16' W.	
Date:	10 Nov. 1963		10 Nov. 1963	
Sample number:	19		20	
Time (P.D.T.):	0105-0138		0140-0215	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	400	81.3	587	81.9
Copepoda	3	0.6	3	0.4
Crustacean larvae	-	-	3	0.4
Chaetognatha	1	0.2	5	0.7
Cnidaria	19	3.9	14	2.0
Pisces	11	2.2	6	0.8
Amphipoda	17	3.5	29	4.0
Pisces, eggs	7	1.4	2	0.3
Pteropoda	1	0.2	3	0.4
Sergestidae	31	6.3	62	8.6
Cephalopoda	2	0.4	3	0.4
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	492	100.0	717	99.9
EUPHAUSIACEA				
Euphausia pacifica	83	20.8	220	37.5
Thysanoessa spinifera	306	76.5	343	58.4
Nematoscelis difficilis	2	0.5	1	0.2
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	9	2.2	23	3.9
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	400	100.0	587	100.0
PISCES				
Lampanyctus leucopsarus	8	72.7	3	50.0
Tarletonbeania crenularis	2	18.2	1	16.7
Diaphus theta	-	-	2	33.3
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	1	9.1	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	11	100.0	6	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	15		16	
Position:	47°58' N. 126°49' W. 48°00' N. 126°46' W.		48°08' N. 126°22.5' W. 48°09' N. 126°22.4' W.	
Date:	10 Nov. 1963		10 Nov. 1963	
Sample number:	21		22	
Time (P.D.T.):	0510-0543		1915-1950	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	130	71.0	453	86.1
Copepoda	4	2.2	-	-
Crustacean larvae	-	-	1	0.2
Chaetognatha	16	8.7	3	0.6
Cnidaria	22	12.0	21	4.0
Pisces	1	0.6	7	1.3
Amphipoda	4	2.2	10	1.9
Pisces, eggs	4	2.2	8	1.5
Pteropoda	-	-	-	-
Sergestidae	-	-	23	4.4
Cephalopoda	2	1.1	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	183	100.0	526	100.0
EUPHAUSIACEA				
Euphausia pacifica	101	77.7	216	47.7
Thysanoessa spinifera	28	21.5	224	49.4
Nematoscelis difficilis	-	-	3	0.7
Thysanoessa longipes	-	-	6	1.3
Nematobrachion flexipes	1	0.8	4	0.9
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	130	100.0	453	100.0
PISCES				
Lampanyctus leucopsarus	1	100.0	3	42.8
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	1	14.3
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	1	14.3
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	2	28.6
Unidentified	-	-	-	-
Total	1	100.0	7	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	17		18	
Position:	48°15' N. 126°11' W. 48°15' N. 126°10.5' W.		48°24' N. 125°54' W. 48°24' N. 125°54.5' W.	
Date:	10 Nov. 1963		10 Nov. 1963	
Sample number:	23		24	
Time (P.D.T.):	2053-2129		2312-2347	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	13,824	98.4	465	98.1
Copepoda	-	-	-	-
Crustacean larvae	-	-	-	-
Chaetognatha	-	-	-	-
Cnidaria	48	0.3	6	1.3
Pisces	5	0.1	-	-
Amphipoda	48	0.3	1	0.2
Pisces, eggs	-	-	-	-
Pteropoda	-	-	1	0.2
Sergestidae	128	0.9	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	1	0.2
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	14,053	100.0	474	100.0
EUPHAUSIACEA				
Euphausia pacifica	12,976	93.9	250	53.8
Thysanoessa spinifera	816	5.9	215	46.2
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	32	0.2	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	13,824	100.0	465	100.0
PISCES				
Lampanyctus leucopsarus	5	100.0	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	5	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	19		20	
Position:	48°35' N. 125°34.3' W. 48°36' N. 125°33' W.		48°30' N. 124°44.5' W. 48°30' N. 124°45' W.	
Date:	10 Nov. 1963		12 Nov. 1963	
Sample number:	25		26	
Time (P.D.T.):	0115-0148		2112-2146	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	64	85.3	50	42.0
Copepoda	-	-	3	2.5
Crustacean larvae	1	1.3	4	3.4
Chaetognatha	-	-	2	1.7
Cnidaria	9	12.0	9	7.6
Pisces	1	1.3	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	2	1.7
Thaliacea	-	-	-	-
Mysidacea	-	-	49	41.2
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	75	99.9	119	100.1
EUPHAUSIACEA				
Euphausia pacifica	62	96.9	42	84.0
Thysanoessa spinifera	1	1.6	-	-
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	1	1.6	-	-
Thysanoessa raschii	-	-	8	16.0
Unidentified	-	-	-	-
Total	64	100.1	50	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	21		22	
Position:	48°18' N. 125°10.5' W. 48.18' N. 125°12.5' W.		48°03.5' N. 125°36.5' W. 48°04' N. 125°36' W.	
Date:	12 Nov. 1963		12 Nov. 1963	
Sample number:	27		28	
Time (P.D.T.):	0334-0407		0519-0602	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	351	84.4	795	91.8
Copepoda	10	2.4	2	0.2
Crustacean larvae	7	1.7	-	-
Chaetognatha	-	-	5	0.6
Cnidaria	43	10.3	61	7.0
Pisces	-	-	-	-
Amphipoda	1	0.2	1	0.1
Pisces, eggs	-	-	2	0.2
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	4	1.0	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	416	100.0	866	99.9
EUPHAUSIACEA				
Euphausia pacifica	346	98.6	191	24.0
Thysanoessa spinifera	5	1.4	604	76.0
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	351	100.0	795	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	23		24	
Position:	48°44.8' N. 125°16.8' W. 48°44' N. 125°18.8' W.		49°02' N. 126°03' W. 49°02' N. 126°02' W.	
Date:	13 Nov. 1963		13 Nov. 1963	
Sample number:	29		30	
Time (P.D.T.):	0019-0053		1946-2020	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	14	7.7	3	7.0
Copepoda	5	2.7	1	2.3
Crustacean larvae	78	42.9	-	-
Chaetognatha	5	2.7	1	2.3
Cnidaria	14	7.7	35	81.4
Pisces	1	0.6	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	1	2.3
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	1	2.3
Thaliacea	-	-	-	-
Mysidacea	65	35.7	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	1	2.3
Total	182	100.0	43	99.9
EUPHAUSIACEA				
Euphausia pacifica	2	14.3	-	-
Thysanoessa spinifera	11	78.6	3	100.0
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	1	7.1	-	-
Total	14	100.0	3	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	24		25	
Position:	49°02' N. 126°02' W. 49°02' N. 126°03' W.		48°55.7' N. 126°14' W. 48°55.5' N. 126°16' W.	
Date:	13 Nov. 1963		14 Nov. 1963	
Sample number:	31		32	
Time (P.D.T.):	2023-2056		0224-0257	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	21	47.7
Copepoda	3	6.1	7	15.9
Crustacean larvae	-	-	-	-
Chaetognatha	1	2.0	-	-
Cnidaria	41	83.7	15	34.1
Pisces	1	2.0	1	2.3
Amphipoda	-	-	-	-
Pisces, eggs	1	2.0	-	-
Pteropoda	1	2.0	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	1	2.0	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	49	99.8	44	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	1	4.8
Thysanoessa spinifera	-	-	20	95.2
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	21	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	1	100.0
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	25		26	
Position:	48°55.5' N. 126°16' W. 48°55.7' N. 126°14' W.		48°49.5' N. 126°24' W. 48°48.5' N. 126°27.5' W.	
Date:	14 Nov. 1963		14 Nov. 1963	
Sample number:	33		34	
Time (P.D.T.):	0259-0333		0436-0510	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	15	41.7	170	90.0
Copepoda	3	8.3	2	1.1
Crustacean larvae	1	2.8	1	0.5
Chaetognatha	-	-	7	3.7
Cnidaria	15	41.7	8	4.2
Pisces	1	2.8	-	-
Amphipoda	-	-	1	0.5
Pisces, eggs	1	2.8	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	36	100.1	189	100.0
EUPHAUSIACEA				
Euphausia pacifica	3	20.0	148	87.0
Thysanoessa spinifera	12	80.0	21	12.4
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	1	0.6
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	15	100.0	170	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	1	100.0	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	26		27	
Position:	48°48.5' N. 126°27.5' W. 48°49.5' N. 126°24' W.		48°20.5' N. 127°13' W. 48°21' N. 127°13' W.	
Date:	14 Nov. 1963		14 Nov. 1963	
Sample number:	35		36	
Time (P.D.T.):	0516-0549		1900-1934	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	25	62.5	152	75.2
Copepoda	-	-	5	2.5
Crustacean larvae	-	-	-	-
Chaetognatha	2	5.0	-	-
Cnidaria	7	17.5	12	5.9
Pisces	-	-	10	5.0
Amphipoda	5	12.5	15	7.4
Pisces, eggs	-	-	1	0.5
Pteropoda	-	-	3	1.5
Sergestidae	1	2.5	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	1	0.5
Caridea	-	-	-	-
Thaliacea	-	-	3	1.5
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	40	100.0	202	100.0
EUPHAUSIACEA				
Euphausia pacifica	16	64.0	55	36.2
Thysanoessa spinifera	8	32.0	34	22.4
Nematoscelis difficilis	-	-	47	30.9
Thysanoessa longipes	-	-	10	6.6
Nematobrachion flexipes	1	4.0	6	3.9
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	25	100.0	152	100.0
PISCES				
Lampanyctus leucopsarus	-	-	5	50.0
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	1	10.0
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	1	10.0
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	3	30.0
Unidentified	-	-	-	-
Total	0	-	10	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	27		28	
Position:	48°21' N. 127°13' W. 48°21' N. 127°14' W.		48°34' N. 126°50' W. 48°34' N. 126°51' W.	
Date:	14 Nov. 1963		14 Nov. 1963	
Sample number:	37		38	
Time (P.D.T.):	1938-2011		2214-2248	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	149	64.2
Copepoda	2	14.3	4	1.7
Crustacean larvae	-	-	-	-
Chaetognatha	1	7.1	8	3.4
Cnidaria	6	42.9	15	6.5
Pisces	2	14.3	8	3.4
Amphipoda	1	7.1	12	5.2
Pisces, eggs	-	-	1	0.4
Pteropoda	1	7.1	2	0.9
Sergestidae	1	7.1	31	13.4
Cephalopoda	-	-	1	0.4
Annelida	-	-	1	0.4
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	14	99.9	232	99.9
EUPHAUSIACEA				
Euphausia pacifica	-	-	49	32.9
Thysanoessa spinifera	-	-	47	31.5
Nematoscelis difficilis	-	-	40	26.8
Thysanoessa longipes	-	-	8	5.4
Nematobrachion flexipes	-	-	5	3.4
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	149	100.0
PISCES				
Lampanyctus leucopsarus	-	-	6	75.0
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	2	100.0	2	25.0
Unidentified	-	-	-	-
Total	2	100.0	8	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	28		29	
Position:	48°34' N. 126°51' W. 48°34' N. 126°50' W.		48°43' N. 126°35' W. 48°43.5' N. 126°38' W.	
Date:	14 Nov. 1963		15 Nov. 1963	
Sample number:	39		40	
Time (P.D.T.):	2252-2326		0037-0111	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	75	49.3	666	77.9
Copepoda	4	2.6	6	0.7
Crustacean larvae	2	1.3	10	1.2
Chaetognatha	12	7.9	14	1.6
Cnidaria	17	11.2	12	1.4
Pisces	2	1.3	9	1.0
Amphipoda	7	4.6	6	0.7
Pisces, eggs	1	0.7	2	0.2
Pteropoda	1	0.7	4	0.5
Sergestidae	26	17.1	126	14.7
Cephalopoda	1	0.7	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	4	2.6	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	152	100.0	855	99.9
EUPHAUSIACEA				
Euphausia pacifica	30	40.0	612	91.9
Thysanoessa spinifera	18	24.0	46	6.9
Nematoscelis difficilis	12	16.0	2	0.3
Thysanoessa longipes	6	8.0	-	-
Nematobrachion flexipes	9	12.0	6	0.9
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	75	100.0	666	100.0
PISCES				
Lampanyctus leucopsarus	2	100.0	5	55.6
Tarletonbeania crenularis	-	-	1	11.1
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	2	22.2
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	1	11.1
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	2	100.0	9	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	29		30	
Position:	48°43.5' N. 126°38' W. 48°43' N. 126°35' W.		48°45' N. 127°36' W. 48°44' N. 127°38.5' W.	
Date:	15 Nov. 1963		17 Nov. 1963	
Sample number:	41		42	
Time (P.D.T.):	0115-0149		0317-0350	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,002	85.6	191	55.4
Copepoda	12	1.0	3	0.9
Crustacean larvae	14	1.2	1	0.3
Chaetognatha	8	0.7	14	4.1
Cnidaria	6	0.5	85	24.6
Pisces	5	0.4	5	1.4
Amphipoda	12	1.0	-	-
Pisces, eggs	2	0.2	1	0.3
Pteropoda	4	0.4	2	0.6
Sergestidae	106	9.0	30	8.7
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	13	3.8
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	1,171	100.0	345	100.1
EUPHAUSIACEA				
Euphausia pacifica	960	95.8	164	85.9
Thysanoessa spinifera	30	3.0	23	12.0
Nematoscelis difficilis	-	-	1	0.5
Thysanoessa longipes	2	0.2	3	1.6
Nematobrachion flexipes	10	1.0	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1,002	100.0	191	100.0
PISCES				
Lampanyctus leucopsarus	4	80.0	4	80.0
Tarletonbeania crenularis	-	-	1	20.0
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	1	20.0	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	5	100.0	5	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	31		32	
Position:	48°55.5' N. 127°17' W. 48°55' N. 127°17' W.		49°03' N. 127°04' W. 49°03' N. 127°05' W.	
Date:	17 Nov. 1963		17 Nov. 1963	
Sample number:	43		44	
Time (P.D.T.):	1835-1908		2019-2053	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	187	60.5	349	70.2
Copepoda	7	2.3	4	0.8
Crustacean larvae	4	1.3	34	6.8
Chaetognatha	5	1.6	4	0.8
Cnidaria	11	3.6	12	2.4
Pisces	10	3.2	5	1.0
Amphipoda	13	4.2	25	5.0
Pisces, eggs	-	-	-	-
Pteropoda	1	0.3	-	-
Sergestidae	71	23.0	61	12.3
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	3	0.6
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	309	100.0	497	99.9
EUPHAUSIACEA				
Euphausia pacifica	107	57.2	138	39.5
Thysanoessa spinifera	67	35.8	204	58.4
Nematoscelis difficilis	1	0.5	-	-
Thysanoessa longipes	3	1.6	1	0.3
Nematobrachion flexipes	9	4.8	6	1.7
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	187	99.9	349	99.9
PISCES				
Lampanyctus leucopsarus	6	60.0	2	40.0
Tarletonbeania crenularis	-	-	1	20.0
Diaphus theta	-	-	1	20.0
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	1	10.0	1	20.0
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	3	30.0	-	-
Unidentified	-	-	-	-
Total	10	100.0	5	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	33		34	
Position:	49°10' N. 126°53' W. 49°10' N. 126°53.5' W.		49°15' N. 126°45' W. 49°15' N. 126°45.4' W.	
Date:	17 Nov. 1963		17 Nov. 1963	
Sample number:	45		46	
Time (P.D.T.):	2145-2219		2301-2335	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	311	93.4	25	56.8
Copepoda	2	0.6	1	2.3
Crustacean larvae	2	0.6	2	4.5
Chaetognatha	-	-	-	-
Cnidaria	17	5.1	15	34.1
Pisces	1	0.3	-	-
Amphipoda	-	-	1	2.3
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	333	100.0	44	100.0
EUPHAUSIACEA				
Euphausia pacifica	112	36.0	-	-
Thysanoessa spinifera	199	64.0	25	100.0
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	311	100.0	25	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	35		36	
Position:	49°20' N. 126°37' W. 49°19' N. 126°39' W.		49°44' N. 127°04' W. 49°44' N. 127°03' W.	
Date:	18 Nov. 1963		18 Nov. 1963	
Sample number:	47		48	
Time (P.D.T.):	0017-0051		1919-1953	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	2	7.7	-	-
Copepoda	-	-	-	-
Crustacean larvae	2	7.7	5	5.9
Chaetognatha	-	-	1	1.2
Cnidaria	21	80.8	78	91.8
Pisces	1	3.8	-	-
Amphipoda	-	-	1	1.2
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	26	100.0	85	100.1
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	2	100.0	-	-
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	2	100.0	0	-
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	36		37	
Position:	49°44' N. 127°03' W. 49°44' N. 127°03.7' W.		49°40' N. 127°11' W. 49°41' N. 127°11' W.	
Date:	18 Nov. 1963		18 Nov. 1963	
Sample number:	49		50	
Time (P.D.T.):	1956-2030		2109-2143	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1	1.8	2,108	98.6
Copepoda	4	7.4	4	0.2
Crustacean larvae	5	9.3	-	-
Chaetognatha	1	1.8	2	0.1
Cnidaria	42	77.8	20	0.9
Pisces	1	1.8	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	4	0.2
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	54	99.9	2,138	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	248	11.8
Thysanoessa spinifera	1	100.0	1,860	88.2
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1	100.0	2,108	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	0	-

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	37		38	
Position:	49°41' N. 127°11' W. 49°40' N. 127°11.5' W.		49°36' N. 127°18' W. 49°36' N. 127°17' W.	
Date:	18 Nov. 1963		18 Nov. 1963	
Sample number:	51		52	
Time (P.D.T.):	2145-2219		2307-2340	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,620	99.4	109	73.2
Copepoda	4	0.2	7	4.7
Crustacean larvae	-	-	-	-
Chaetognatha	2	0.1	-	-
Cnidaria	4	0.2	19	12.8
Pisces	-	-	1	0.7
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	11	7.4
Cephalopoda	-	-	1	0.7
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	1	0.7
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	1,630	99.9	149	100.2
EUPHAUSIACEA				
Euphausia pacifica	92	5.7	40	36.7
Thysanoessa spinifera	1,528	94.3	69	63.3
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1,620	100.0	109	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	1	100.0
Total	0	-	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	38		39	
Position:	49°36' N. 127°18' W. 49°36' N. 127°17' W.		50°02.5' N. 127°54.5' W. 50°02' N. 127°55' W.	
Date:	18 Nov. 1963		19 Nov. 1963	
Sample number:	53		54	
Time (P.D.T.):	2344-0017		2142-2216	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	30	38.0	1,660	90.5
Copepoda	-	-	-	-
Crustacean larvae	2	2.5	12	0.6
Chaetognatha	-	-	4	0.2
Cnidaria	37	46.8	8	0.4
Pisces	1	1.3	1	0.1
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	9	11.4	108	5.9
Cephalopoda	-	-	1	0.1
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	40	2.2
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	79	100.0	1,834	100.0
EUPHAUSIACEA				
Euphausia pacifica	14	46.7	828	49.9
Thysanoessa spinifera	16	53.3	832	50.1
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	30	100.0	1,660	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	1	100.0
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	1	100.0	-	-
Unidentified	-	-	-	-
Total	1	100.0	1	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	40		41	
Position:	50°01' N. 127°57.5' W. 50°01' N. 127°57' W.		49°56' N. 128°07' W. 49°56' N. 128°10.5' W.	
Date:	19 Nov. 1963		20 Nov. 1963	
Sample number:	55		56	
Time (P.D.T.):	2234-2308		0002-0036	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,008	64.5	556	62.0
Copepoda	-	-	4	0.4
Crustacean larvae	24	1.5	4	0.4
Chaetognatha	-	-	24	2.7
Cnidaria	28	1.8	8	0.9
Pisces	2	0.1	8	0.9
Amphipoda	-	-	-	-
Pisces, eggs	-	-	4	0.4
Pteropoda	-	-	-	-
Sergestidae	168	10.8	236	26.3
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	332	21.2	48	5.4
Mysidacea	-	-	-	-
Gastropod veliger	-	-	4	0.4
Isopoda	-	-	-	-
Total	1,562	99.9	896	99.8
EUPHAUSIACEA				
Euphausia pacifica	836	82.9	360	64.7
Thysanoessa spinifera	172	17.1	188	33.8
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	-	-	4	0.7
Nematobrachion flexipes	-	-	4	0.7
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	1,008	100.0	556	99.9
PISCES				
Lampanyctus leucopsarus	1	50.0	6	75.0
Tarletonbeania crenularis	1	50.0	1	12.5
Diaphus theta	-	-	1	12.5
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	2	100.0	8	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963--continued

Station:	42		43	
Position:	49°43' N. 128°30' W. 49°43' N. 128°33' W.		49°24.5' N. 127°36' W. 49°24.5' N. 127°39' W.	
Date:	20 Nov. 1963		22 Nov. 1963	
Sample number:	57		58	
Time (P.D.T.):	0232-0306		0412-0447	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	179	89.5	266	45.2
Copepoda	-	-	8	1.4
Crustacean larvae	-	-	18	3.1
Chaetognatha	6	3.0	42	7.1
Cnidaria	11	5.5	2	0.3
Pisces	2	1.0	2	0.3
Amphipoda	1	0.5	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	1	0.5	244	41.5
Cephalopoda	-	-	-	-
Annelida	-	-	2	0.3
Caridea	-	-	-	-
Thaliacea	-	-	4	0.7
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	200	100.0	588	99.9
EUPHAUSIACEA				
Euphausia pacifica	94	52.5	172	64.7
Thysanoessa spinifera	63	35.2	88	33.1
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	22	12.3	6	2.2
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	179	100.0	266	100.0
PISCES				
Lampanyctus leucopsarus	2	100.0	2	100.0
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	2	100.0	2	100.0

Appendix Table 2.--Analyses of samples from 30-minute oblique tows taken off Vancouver Island and Washington, fall 1963 --continued

Station:	43		44	
Position:	49°24.5' N. 127°39' W. 49°24.5' N. 127°36' W.		49°28' N. 127°27' W. 49°30' N. 127°29' W.	
Date:	22 Nov. 1963		22 Nov. 1963	
Sample number:	59		60	
Time (P.D.T.):	0450-0523		0132-0206	
Sample depth (m.):	30 to surface		30 to surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	154	39.5	64	23.2
Copepoda	4	1.0	-	-
Crustacean larvae	20	5.1	-	-
Chaetognatha	20	5.1	2	0.7
Cnidaria	4	1.0	14	5.1
Pisces	-	-	6	2.2
Amphipoda	4	1.0	12	4.4
Pisces, eggs	-	-	2	0.7
Pteropoda	-	-	2	0.7
Sergestidae	184	47.2	174	63.0
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Thaliacea	-	-	-	-
Mysidacea	-	-	-	-
Gastropod veliger	-	-	-	-
Isopoda	-	-	-	-
Total	390	99.9	276	100.0
EUPHAUSIACEA				
Euphausia pacifica	86	55.8	36	56.2
Thysanoessa spinifera	64	41.6	28	43.8
Nematoscelis difficilis	-	-	-	-
Thysanoessa longipes	4	2.6	-	-
Nematobrachion flexipes	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Thysanoessa raschii	-	-	-	-
Unidentified	-	-	-	-
Total	154	100.0	64	100.0
PISCES				
Lampanyctus leucopsarus	-	-	6	100.0
Tarletonbeania crenularis	-	-	-	-
Diaphus theta	-	-	-	-
Engraulis mordax	-	-	-	-
Thaleichthys pacificus	-	-	-	-
Cololabis saira	-	-	-	-
Tactostoma macropus	-	-	-	-
Bathylagus pacificus	-	-	-	-
Myctophum californiense	-	-	-	-
Lestidium ringens	-	-	-	-
Larval and post-larval fish	-	-	-	-
Unidentified	-	-	-	-
Total	0	-	6	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°33' N. 126°51' W.		48°33' N. 126°51' W. 48°33' N. 126°50' W.	
Date:	8, 9 May 1963		9 May 1963	
Sample number:	11		12	
Time (P.D.T.):	2359-0023		0033-0050	
Sample depth (m):	150		75	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	48	13.5	64	0.7
Copepoda	57	16.0	352	4.1
Crustacean larvae	6	1.7	7,728	90.4
Chaetognatha	85	23.9	64	0.7
Cnidaria	75	21.1	160	1.9
Pisces	4	1.1	133	1.6
Amphipoda	3	0.8	16	0.2
Pisces, eggs	-	-	-	-
Pteropoda	64	18.0	32	0.4
Sergestidae	9	2.5	-	-
Ctenophora	1	0.3	-	-
Cephalopoda	2	0.6	-	-
Annelida	2	0.6	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	356	100.1	8,549	100.0
EUPHAUSIACEA				
Euphausia pacifica	20	41.7	64	100.0
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	27	56.2	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	1	2.1	-	-
Total	48	100.0	64	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	1	25.0	-	-
Tactostoma macropus	1	25.0	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	50.0	133	100.0
Total	4	100.0	133	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°33' N. 126°51' W.		48°33' N. 126°51' W. 48°33' N. 126°50' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	13		14	
Time (P.D.T.):	0100-0117		0120-0133	
Sample depth (m.):	30		15	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,012	65.5	12	2.5
Copepoda	232	15.0	231	48.4
Crustacean larvae	204	13.2	31	6.5
Chaetognatha	26	1.7	41	8.6
Cnidaria	52	3.4	80	16.8
Pisces	5	0.3	2	0.4
Amphipoda	2	0.1	3	0.6
Pisces, eggs	-	-	11	2.3
Pteropoda	4	0.3	10	2.1
Sergestidae	8	0.5	37	7.8
Ctenophora	-	-	-	-
Cephalopoda	-	-	3	0.6
Annelida	-	-	16	3.4
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	1,545	100.0	477	100.0
EUPHAUSIACEA				
Euphausia pacifica	958	94.7	5	41.7
Thysanoessa spinifera	46	4.5	5	41.7
Thysanoessa longipes	8	0.8	1	8.3
Nematoscelis difficilis	-	-	1	8.3
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	1,012	100.0	12	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	2	40.0	1	50.0
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	3	60.0	1	50.0
Total	5	100.0	2	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°33' N. 126°51' W.		48°34' N. 126°48' W. 48°33' N. 126°49' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	15		16	
Time (P.D.T.):	0143-0155		0404-0416	
Sample depth (m):	surface		surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	-	-
Copepoda	12	1.0	8	0.7
Crustacean larvae	1,084	92.6	1,108	93.2
Chaetognatha	2	0.2	2	0.2
Cnidaria	34	2.9	-	-
Pisces	30	2.6	19	1.6
Amphipoda	-	-	14	1.2
Pisces, eggs	4	0.3	18	1.5
Pteropoda	2	0.2	2	0.2
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	2	0.2	18	1.5
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	1,170	100.0	1,189	100.1
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	0	-	0	-
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	1	3.3	3	15.8
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	1	5.3
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	29	96.7	15	78.9
Total	30	100.0	19	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°49' W. 48°34' N. 126°48' W.		48°34' N. 126°48' W. 48°33' N. 126°49' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	17		18	
Time (P.D.T.):	0421-0437		0436-0452	
Sample depth (m):	15		30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	6	1.9	722	68.5
Copepoda	24	7.6	98	9.3
Crustacean larvae	36	11.4	12	1.1
Chaetognatha	32	10.2	50	4.7
Cnidaria	148	47.0	54	5.1
Pisces	2	0.6	-	-
Amphipoda	-	-	4	0.4
Pisces, eggs	7	2.2	8	0.8
Pteropoda	37	11.8	72	6.8
Sergestidae	21	6.7	32	3.0
Ctenophora	-	-	-	-
Cephalopoda	2	0.6	-	-
Annelida	-	-	2	0.2
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	315	100.0	1,054	99.9
EUPHAUSIACEA				
Euphausia pacifica	-	-	620	85.9
Thysanoessa spinifera	-	-	44	6.1
Thysanoessa longipes	1	16.7	50	6.9
Nematoscelis difficilis	5	83.3	6	0.8
Tessarabrachion oculatus	-	-	2	0.3
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	6	100.0	722	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	100.0	-	-
Total	2	100.0	0	-

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963 --continued

Station:	8		8	
Position:	48°33' N. 126°49' W. 48°34' N. 126°48' W.		48°34' N. 126°48' W. 48°33' N. 126°49' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	19		20	
Time (P.D.T.):	0453-0511		0513-0536	
Sample depth (m.):	75		150	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	546	69.9	156	17.7
Copepoda	66	8.4	452	51.2
Crustacean larvae	18	2.3	2	0.2
Chaetognatha	38	4.9	112	12.7
Cnidaria	40	5.1	26	2.9
Pisces	5	0.6	3	0.3
Amphipoda	6	0.8	2	0.2
Pisces, eggs	-	-	-	-
Pteropoda	40	5.1	100	11.3
Sergestidae	18	2.3	30	3.4
Ctenophora	-	-	-	-
Cephalopoda	2	0.3	-	-
Annelida	2	0.3	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	781	100.0	883	99.9
EUPHAUSIACEA				
Euphausia pacifica	492	90.1	128	82.0
Thysanoessa spinifera	10	1.8	12	7.7
Thysanoessa longipes	38	7.0	10	6.4
Nematoscelis difficilis	4	0.7	2	1.3
Tessarabrachion oculatus	2	0.4	4	2.6
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	546	100.0	156	100.0
PISCES				
Lampanyctus leucopsarus	1	20.0	1	33.3
Tarletonbeania crenularis	1	20.0	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	1	33.3
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	3	60.0	1	33.3
Total	5	100.0	3	99.9

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°33' N. 126°51' W.		48°32' N. 126°51' W. 48°33' N. 126°50' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	21		22	
Time (P.D.T.):	1234-1304		1630-1659	
Sample depth (m):	150		150	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	9	2.1	17	7.0
Copepoda	108	24.9	19	7.9
Crustacean larvae	5	1.2	9	3.7
Chaetognatha	226	52.1	150	62.2
Cnidaria	7	1.6	15	6.2
Pisces	2	0.5	1	0.4
Amphipoda	3	0.7	1	0.4
Pisces, eggs	3	0.7	1	0.4
Pteropoda	55	12.7	14	5.8
Sergestidae	15	3.5	10	4.2
Ctenophora	-	-	-	-
Cephalopoda	1	0.2	-	-
Annelida	-	-	4	1.7
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	434	100.2	241	99.9
EUPHAUSIACEA				
Euphausia pacifica	2	22.2	-	-
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	6	66.7	17	100.0
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	1	11.1	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	9	100.0	17	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	100.0	1	100.0
Total	2	100.0	1	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°32' N. 126°51' W.		48°32' N. 126°51' W. 48°33' N. 126°50' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	23		24	
Time (P.D.T.):	1703-1720		1723-1738	
Sample depth (m):	75		30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	45	8.6
Copepoda	21	10.7	260	49.8
Crustacean larvae	2	1.0	49	9.4
Chaetognatha	104	53.1	73	14.0
Cnidaria	7	3.6	3	0.6
Pisces	2	1.0	1	0.2
Amphipoda	5	2.6	4	0.8
Pisces, eggs	2	1.0	5	1.0
Pteropoda	50	25.5	82	15.7
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	1	0.5	-	-
Annelida	2	1.0	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	196	100.0	522	100.1
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	-	-	45	100.0
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	0	-	45	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	100.0	1	100.0
Total	2	100.0	1	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°32' N. 126°51' W.		48°32' N. 126°51' W. 48°33' N. 126°50' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	25		26	
Time (P.D.T.):	1740-1753		1754-1805	
Sample depth (m):	15		Surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	8	2.5	-	-
Copepoda	131	40.3	1	6.7
Crustacean larvae	10	3.1	1	6.7
Chaetognatha	22	6.8	-	-
Cnidaria	3	0.9	5	33.3
Pisces	-	-	-	-
Amphipoda	1	0.3	-	-
Pisces, eggs	8	2.5	8	53.3
Pteropoda	142	43.7	-	-
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	325	100.1	15	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	8	100.0	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	8	100.0	0	-
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	0	-

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°33' N. 126°51' W.		48°33' N. 126°51' W. 48°33' N. 126°50' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	27		28	
Time (P.D.T.):	2213-2237		2239-2254	
Sample depth (m):	150		75	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	94	36.3	124	28.5
Copepoda	44	17.0	20	4.6
Crustacean larvae	14	5.4	47	10.8
Chaetognatha	40	15.4	98	22.5
Cnidaria	38	14.7	24	5.5
Pisces	4	1.5	6	1.4
Amphipoda	2	0.8	5	1.2
Pisces, eggs	1	0.4	-	-
Pteropoda	11	4.2	87	20.0
Sergestidae	5	1.9	19	4.4
Ctenophora	-	-	-	-
Cephalopoda	4	1.5	4	0.9
Annelida	2	0.8	1	0.2
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	259	99.9	435	100.0
EUPHAUSIACEA				
Euphausia pacifica	69	73.4	43	34.7
Thysanoessa spinifera	2	2.1	7	5.6
Thysanoessa longipes	19	20.2	73	58.9
Nematoscelis difficilis	1	1.1	1	0.8
Tessarabrachion oculatus	3	3.2	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	94	100.0	124	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	1	16.7
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	25.0	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	1	25.0	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	50.0	5	83.3
Total	4	100.0	6	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		8	
Position:	48°33' N. 126°50' W. 48°32' N. 126°51' W.		48°33' N. 126°50' W. 48°33' N. 126°51' W.	
Date:	9 May 1963		9 May 1963	
Sample number:	29		30	
Time (P.D.T.):	2258-2311		2314-2327	
Sample depth (m):	30		15	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	192	43.5	36	9.0
Copepoda	46	10.4	47	11.8
Crustacean larvae	10	2.3	55	13.8
Chaetognatha	24	5.4	32	8.0
Cnidaria	97	22.0	87	21.8
Pisces	4	0.9	6	1.5
Amphipoda	4	0.9	-	-
Pisces, eggs	3	0.7	6	1.5
Pteropoda	35	7.9	38	9.5
Sergestidae	20	4.5	82	20.6
Ctenophora	-	-	-	-
Cephalopoda	3	0.7	-	-
Annelida	3	0.7	10	2.5
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	441	99.9	399	100.0
EUPHAUSIACEA				
Euphausia pacifica	127	66.1	7	19.4
Thysanoessa spinifera	14	7.3	1	2.8
Thysanoessa longipes	43	22.4	26	72.2
Nematoscelis difficilis	8	4.2	2	5.6
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	192	100.0	36	100.0
PISCES				
Lampanyctus leucopsarus	3	75.0	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	25.0	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	6	100.0
Total	4	100.0	6	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	8		17	
Position:	48°33' N. 126°51' W. 48°32' N. 126°50' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	9 May 1963		15 May 1963	
Sample number:	31		52	
Time (P.D.T.):	2334-2345		2112-2137	
Sample depth (m):	Surface		150	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	174	48.6
Copepoda	60	7.0	39	10.9
Crustacean larvae	634	74.1	55	15.4
Chaetognatha	12	1.4	27	7.5
Cnidaria	66	7.7	41	11.4
Pisces	42	4.9	3	0.8
Amphipoda	-	-	4	1.1
Pisces, eggs	12	1.4	-	-
Pteropoda	20	2.3	2	0.6
Sergestidae	2	0.2	6	1.7
Ctenophora	-	-	1	0.3
Cephalopoda	8	0.9	2	0.6
Annelida	-	-	4	1.1
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	856	99.9	358	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	161	92.5
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	-	-	7	4.0
Nematoscelis difficilis	-	-	6	3.4
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	0	-	174	99.9
PISCES				
Lampanyctus leucopsarus	-	-	2	66.7
Tarletonbeania crenularis	19	45.2	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	4	9.5	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	19	45.2	1	33.3
Total	42	99.9	3	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°44' N. 125°20' W.		46°44' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	15 May 1963		15 May 1963	
Sample number:	53		54	
Time (P.D.T.):	2139-2156		2158-2213	
Sample depth (m):	75		30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	190	63.1	2,352	85.3
Copepoda	58	19.3	264	9.6
Crustacean larvae	24	8.0	32	1.2
Chaetognatha	-	-	16	0.6
Cnidaria	11	3.6	32	1.2
Pisces	-	-	4	0.1
Amphipoda	8	2.7	16	0.6
Pisces, eggs	-	-	-	-
Pteropoda	1	0.3	8	0.3
Sergestidae	3	1.0	16	0.6
Ctenophora	-	-	-	-
Cephalopoda	4	1.3	8	0.3
Annelida	2	0.7	8	0.3
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	301	100.0	2,756	100.1
EUPHAUSIACEA				
Euphausia pacifica	141	74.2	2,336	99.3
Thysanoessa spinifera	3	1.6	8	0.3
Thysanoessa longipes	36	19.0	8	0.3
Nematoscelis difficilis	10	5.3	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	190	100.1	2,352	99.9
PISCES				
Lampanyctus leucopsarus	-	-	4	100.0
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	4	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.		46°45' N. 125°21' W. 46°44' N. 125°20' W.	
Date:	15 May 1963		15 May 1963	
Sample number:	55		56	
Time (P.D.T.):	2214-2227		2229-2241	
Sample depth (m):	20		10	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,912	85.6	1,672	91.2
Copepoda	164	7.3	116	6.3
Crustacean larvae	60	2.7	8	0.4
Chaetognatha	4	0.2	-	-
Cnidaria	16	0.7	12	0.6
Pisces	9	0.4	1	0.1
Amphipoda	4	0.2	4	0.2
Pisces, eggs	-	-	-	-
Pteropoda	8	0.4	4	0.2
Sergestidae	24	1.1	16	0.9
Ctenophora	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	32	1.4	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	2,233	100.0	1,833	99.9
EUPHAUSIACEA				
Euphausia pacifica	1,892	99.0	1,672	100.0
Thysanoessa spinifera	16	0.8	-	-
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	4	0.2	-	-
Stylocheiron maximum	-	-	-	-
Total	1,912	100.0	1,672	100.0
PISCES				
Lampanyctus leucopsarus	7	77.8	-	-
Tarletonbeania crenularis	2	22.2	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	1	100.0
Total	9	100.0	1	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°44' N. 125°20' W. 46°45' N. 125°21' W.		46°45' N. 125°19' W. 46°45' N. 125°21' W.	
Date:	15 May 1963		16 May 1963	
Sample number:	57		59	
Time (P.D.T.):	2242-2253		0020-0045	
Sample depth (m):	Surface		150	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	7	3.2	86	48.0
Copepoda	58	26.7	15	8.4
Crustacean larvae	27	12.4	10	5.6
Chaetognatha	1	0.5	13	7.3
Cnidaria	48	22.1	29	16.2
Pisces	74	34.1	15	8.4
Amphipoda	-	-	2	1.1
Pisces, eggs	-	-	-	-
Pteropoda	2	0.9	-	-
Sergestidae	-	-	1	0.6
Ctenophora	-	-	-	-
Cephalopoda	-	-	2	1.1
Annelida	-	-	6	3.4
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	217	99.9	179	100.1
EUPHAUSIACEA				
Euphausia pacifica	7	100.0	74	86.0
Thysanoessa spinifera	-	-	7	8.1
Thysanoessa longipes	-	-	4	4.6
Nematoscelis difficilis	-	-	1	1.2
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	7	100.0	86	99.9
PISCES				
Lampanyctus leucopsarus	-	-	1	6.7
Tarletonbeania crenularis	71	95.9	14	93.3
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	1.4	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	2	2.7	-	-
Total	74	100.0	15	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	60		61	
Time (P.D.T.):	0052-0111		0112-0125	
Sample depth (m):	75		30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	94	62.2	154	60.9
Copepoda	29	19.2	28	11.1
Crustacean larvae	8	5.3	16	6.3
Chaetognatha	-	-	2	0.8
Cnidaria	10	6.6	25	9.9
Pisces	1	0.7	7	2.8
Amphipoda	-	-	6	2.4
Pisces, eggs	1	0.7	-	-
Pteropoda	-	-	4	1.6
Sergestidae	5	3.3	6	2.4
Ctenophora	1	0.7	-	-
Cephalopoda	-	-	2	0.8
Annelida	2	1.3	3	1.2
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	151	100.0	253	100.2
EUPHAUSIACEA				
Euphausia pacifica	80	85.1	134	87.0
Thysanoessa spinifera	2	2.1	6	3.9
Thysanoessa longipes	11	11.7	6	3.9
Nematoscelis difficilis	1	1.1	8	5.2
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	94	100.0	154	100.0
PISCES				
Lampanyctus leucopsarus	-	-	2	28.6
Tarletonbeania crenularis	1	100.0	3	42.8
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	2	28.6
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	1	100.0	7	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	62		63	
Time (P.D.T.):	0128-0142		0144-0157	
Sample depth (m):	20		10	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	531	78.3	870	77.5
Copepoda	54	8.0	188	16.7
Crustacean larvae	30	4.4	22	2.0
Chaetognatha	4	0.6	12	1.1
Cnidaria	23	3.4	14	1.2
Pisces	3	0.4	3	0.3
Amphipoda	6	0.9	6	0.5
Pisces, eggs	-	-	-	-
Pteropoda	7	1.0	2	0.2
Sergestidae	14	2.1	-	-
Ctenophora	-	-	-	-
Cephalopoda	1	0.2	2	0.2
Annelida	5	0.7	4	0.4
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	678	100.0	1,123	100.1
EUPHAUSIACEA				
Euphausia pacifica	479	90.2	868	99.8
Thysanoessa spinifera	41	7.7	2	0.2
Thysanoessa longipes	5	0.9	-	-
Nematoscelis difficilis	6	1.1	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	531	99.9	870	100.0
PISCES				
Lampanyctus leucopsarus	2	66.7	1	33.3
Tarletonbeania crenularis	1	33.3	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	2	66.7
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	3	100.0	3	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.		46°45' N. 125°21' W. 46°45' N. 125°20' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	64		66	
Time (P.D.T.):	0159-0211		0410-0422	
Sample depth (m):	Surface		Surface	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	2	2.9	2	2.3
Copepoda	7	10.3	32	36.4
Crustacean larvae	7	10.3	40	45.4
Chaetognatha	-	-	-	-
Cnidaria	14	20.6	3	3.4
Pisces	35	51.5	10	11.4
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	2	2.9	1	1.1
Sergestidae	-	-	-	-
Ctenophora	1	1.5	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	68	100.0	88	100.0
EUPHAUSIACEA				
Euphausia pacifica	2	100.0	2	100.0
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	2	100.0	2	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	34	97.1	6	60.0
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	1	10.0
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	1	2.8	3	30.0
Total	35	99.9	10	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°20' W. 46°45' N. 125°19' W.		46°45' N. 125°19' W. 46°45' N. 125°20' W	
Date:	16 May 1963		16 May 1963	
Sample number:	67		68	
Time (P.D.T.):	0423-0436		0438-0451	
Sample depth (m):	10		20	
	Number	Percen'	Number	Percent
TOTAL PLANKTON				
Euphausiacea	704	86.7	574	86.7
Copepoda	76	9.4	76	11.5
Crustacean larvae	16	2.0	6	0.9
Chaetognatha	-	-	-	-
Cnidaria	16	2.0	6	0.9
Pisces	-	-	-	-
Amphipoda	-	-	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	812	100.1	662	100.0
EUPHAUSIACEA				
Euphausia pacifica	684	97.2	490	85.4
Thysanoessa spinifera	20	2.8	80	13.9
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	4	0.7
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	704	100.0	574	100.0
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	0	-

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°20' W. 46°45' N. 125°19' W.		46°45' N. 125°19' W. 46°45' N. 125°20' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	69		70	
Time (P.D.T.):	0454-0507		0511-0529	
Sample depth (m):	30		75	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	1,968	86.9	692	87.9
Copepoda	232	10.2	72	9.2
Crustacean larvae	56	2.5	4	0.5
Chaetognatha	-	-	2	0.2
Cnidaria	8	0.4	12	1.5
Pisces	-	-	1	0.1
Amphipoda	-	-	2	0.2
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	-	-	2	0.2
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	2,264	100.0	787	99.8
EUPHAUSIACEA				
Euphausia pacifica	1,832	93.1	598	86.4
Thysanoessa spinifera	120	6.1	82	11.8
Thysanoessa longipes	16	0.8	2	0.3
Nematoscelis difficilis	-	-	10	1.4
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	1,968	100.0	692	99.9
PISCES				
Lampanyctus leucopsarus	-	-	1	100.0
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	1	100.0

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°20' W. 46°45' N. 125°21' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	71		72	
Time (P.D.T.):	0539-0558		1207-1233	
Sample depth (m.):	150		150	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	193	63.3	47	63.5
Copepoda	44	14.4	7	9.4
Crustacean larvae	1	0.3	5	6.8
Chaetognatha	25	8.2	10	13.5
Cnidaria	21	6.9	-	-
Pisces	2	0.7	-	-
Amphipoda	10	3.3	5	6.8
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	5	1.6	-	-
Ctenophora	1	0.3	-	-
Cephalopoda	3	1.0	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	305	100.0	74	100.0
EUPHAUSIACEA				
Euphausia pacifica	165	85.5	45	95.7
Thysanoessa spinifera	20	10.4	-	-
Thysanoessa longipes	5	2.6	1	2.1
Nematoscelis difficilis	1	0.5	1	2.1
Tessarabrachion oculatus	2	1.0	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	193	100.0	47	99.9
PISCES				
Lampanyctus leucopsarus	1	50.0	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	1	50.0	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	2	100.0	0	-

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963 --continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	73		74	
Time (P.D.T.):	1232-1251		1259-1312	
Sample depth (m):	75		30	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	-	-
Copepoda	7	43.8	1	25.0
Crustacean larvae	8	50.0	1	25.0
Chaetognatha	-	-	-	-
Cnidaria	-	-	2	50.0
Pisces	-	-	-	-
Amphipoda	1	6.2	-	-
Pisces, eggs	-	-	-	-
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Ctenophora	-	-	-	-
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	16	100.0	4	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	0	-	0	-
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	0	-

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17		17	
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.		46°45' N. 125°20' W. 46°45' N. 125°21' W.	
Date:	16 May 1963		16 May 1963	
Sample number:	75		76	
Time (P.D.T.):	1315-1328		1331-1344	
Sample depth (m):	20		10	
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-	-	-
Copepoda	4	40.0	2	25.0
Crustacean larvae	2	20.0	2	25.0
Chaetognatha	-	-	-	-
Cnidaria	1	10.0	2	25.0
Pisces	-	-	-	-
Amphipoda	-	-	-	-
Pisces, eggs	2	20.0	1	12.5
Pteropoda	-	-	-	-
Sergestidae	-	-	-	-
Ctenophora	1	10.0	1	12.5
Cephalopoda	-	-	-	-
Annelida	-	-	-	-
Caridea	-	-	-	-
Cumacea	-	-	-	-
Thaliacea	-	-	-	-
Total	10	100.0	8	100.0
EUPHAUSIACEA				
Euphausia pacifica	-	-	-	-
Thysanoessa spinifera	-	-	-	-
Thysanoessa longipes	-	-	-	-
Nematoscelis difficilis	-	-	-	-
Tessarabrachion oculatus	-	-	-	-
Nematobrachion flexipes	-	-	-	-
Stylocheiron maximum	-	-	-	-
Total	0	-	0	-
PISCES				
Lampanyctus leucopsarus	-	-	-	-
Tarletonbeania crenularis	-	-	-	-
Ammodytes hexapterus	-	-	-	-
Anoplopoma fimbria	-	-	-	-
Electrona arctica	-	-	-	-
Tactostoma macropus	-	-	-	-
Diaphus theta	-	-	-	-
Lampanyctus ritteri	-	-	-	-
Larval and post-larval fish	-	-	-	-
Total	0	-	0	-

Appendix Table 3.--Analyses of samples from 10-minute horizontal tows taken at stations 8 and 17, spring 1963--continued

Station:	17			
Position:	46°45' N. 125°21' W. 46°45' N. 125°20' W.			
Date:	16 May 1963			
Sample number:	77			
Time (P.D.T.):	1347-1358			
Sample depth (m):	Surface			
	Number	Percent	Number	Percent
TOTAL PLANKTON				
Euphausiacea	-	-		
Copepoda	-	-		
Crustacean larvae	-	-		
Chaetognatha	-	-		
Cnidaria	-	-		
Pisces	-	-		
Amphipoda	-	-		
Pisces, eggs	-	-		
Pteropoda	-	-		
Sergestidae	-	-		
Ctenophora	-	-		
Cephalopoda	-	-		
Annelida	-	-		
Caridea	-	-		
Cumacea	-	-		
Thaliacea	-	-		
Total	0	-		
EUPHAUSIACEA				
Euphausia pacifica	-	-		
Thysanoessa spinifera	-	-		
Thysanoessa longipes	-	-		
Nematoscelis difficilis	-	-		
Tessarabrachion oculatus	-	-		
Nematobrachion flexipes	-	-		
Stylocheiron maximum	-	-		
Total	0	-		
PISCES				
Lampanyctus leucopsarus	-	-		
Tarletonbeania crenularis	-	-		
Ammodytes hexapterus	-	-		
Anoplopoma fimbria	-	-		
Electrona arctica	-	-		
Tactostoma macropus	-	-		
Diaphus theta	-	-		
Lampanyctus ritteri	-	-		
Larval and post-larval fish	-	-		
Total	0	-		

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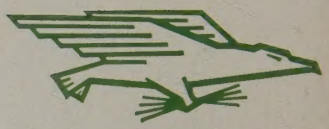

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